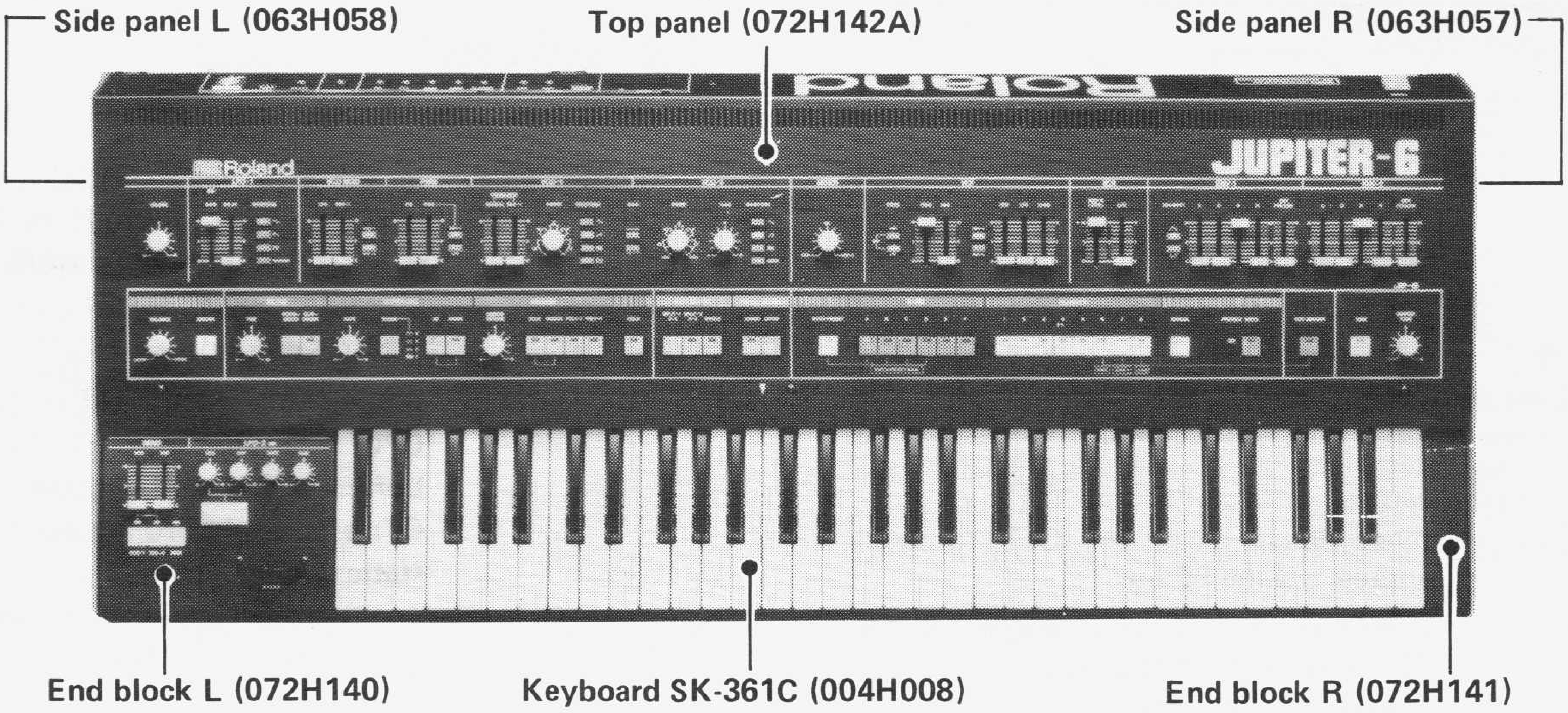
JP-6

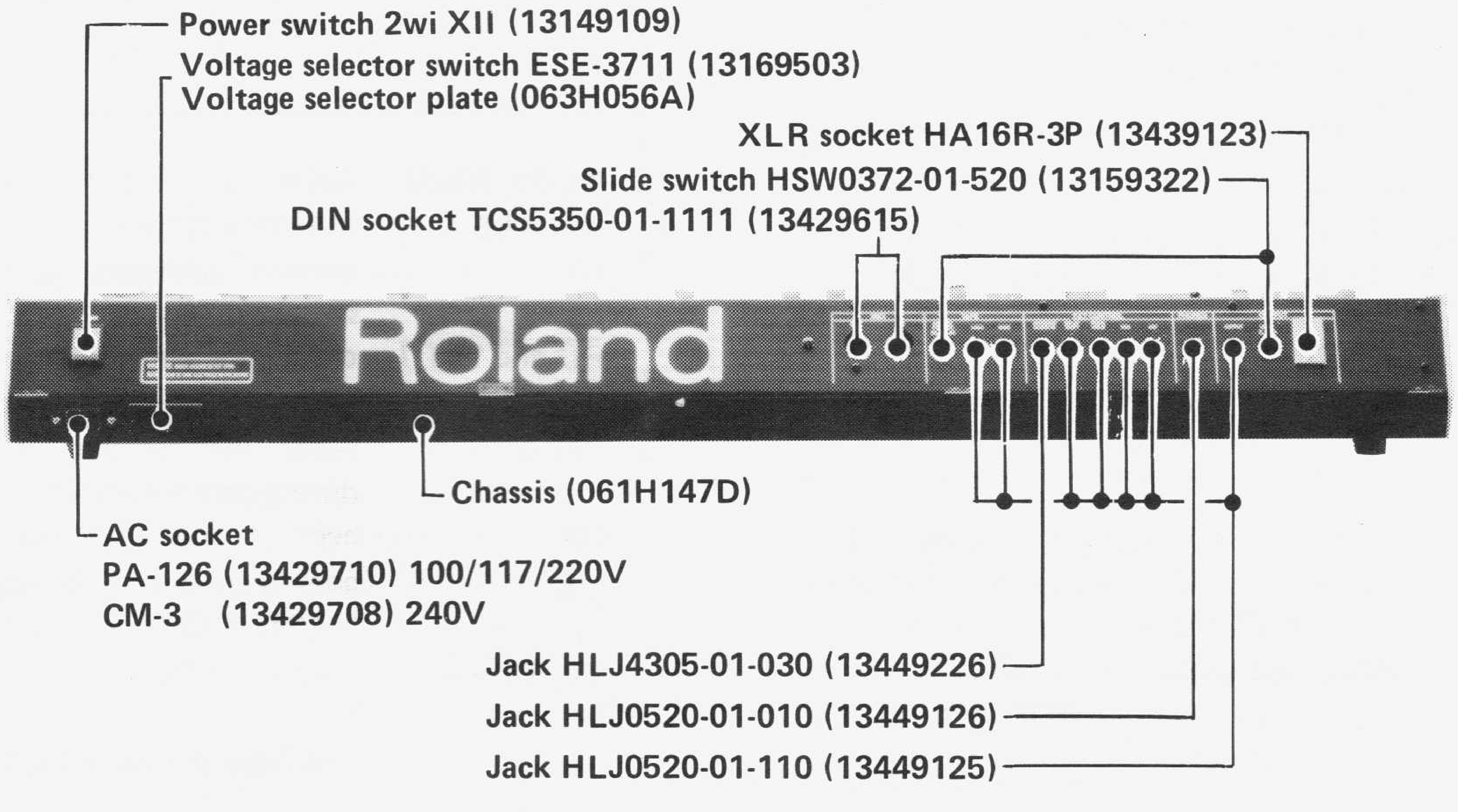
SERVICE NOTES

First Edition

SPECIFICATIONS

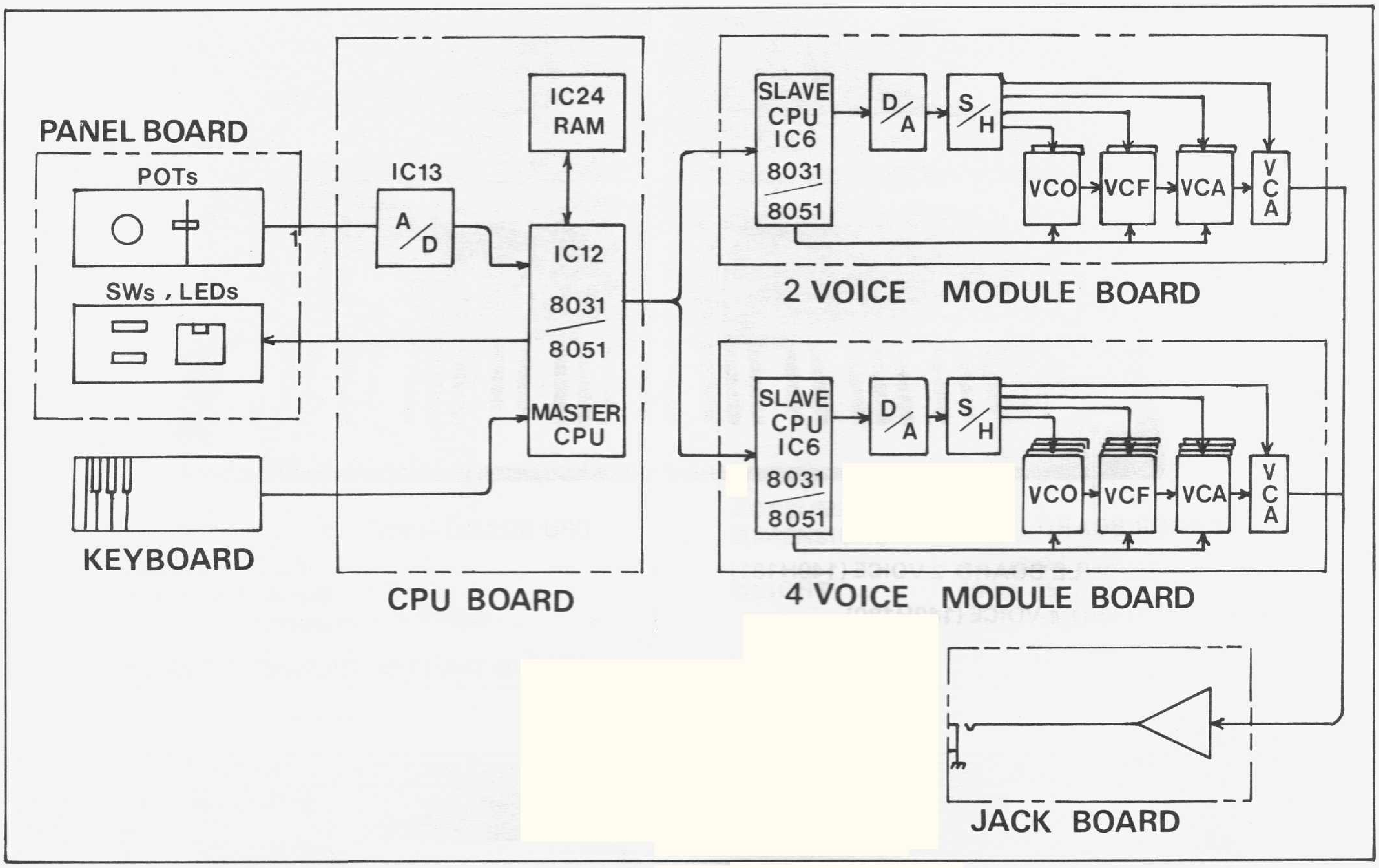
KEYBOARD	61 keys, 5 octaves, C scale
MASTER TUNE	±50 cents
VCO MOD	LFO 10 oct; ENV-1 5 oct
PWM	50-0%
VCF	LPF 24dB; HPF 24dB; BPF 12dB Cutoff frequency 5Hz-30kHz ENV more than 10 octaves LFO more than 10 octaves Key Follow 0-120%
VCA	ENV-2 Level 60dB max.
ENV-1 (VCO, VCF, PWM)	Attack Time 18s max. Decay Time 20s max. Release Time 20s max. Key Follow 0-120%
ENV-2 (VCF, VCA)	Attack Time 18s max. Decay Time 20s max. Release Time 20s max. Key Follow 0-120%
LFO-1	Rate 0.04-100Hz; Random 0.04-400Hz Delay Time 0-2s
LFO-2	VCO Sens more than ±100 cents VCF Sens ±4 oct; Rise Time 50ms-1s
ARPEGGIO	Rate 1-25Hz; Range 1, 2, 3, 4 octaves
GLIDE	Time 0-1.6s/oct
BENDER	Range greater than 3 oct Up/Down VCO Sens ±1 oct; VCF sens ±5 oct
OUTPUT	1/4 phone jack 0/–15/–30dB XLR impedance 600 ohms Headphones 8 ohms, stereo
EXTERNAL CONT	Arpeggio 1 step/clock (more than 2.5V) VCA –20dB; VCF –6 to +2 oct
POWER CONSUMPTION	30 watts
DIMENSIONS	1063(W) x 434(D) x 120(H)mm 41-7/8(W) x 17-1/16(D) x 4-3/4(H)in
WEIGHT	16 kg 35 lb 4 oz


Side panel L (063H058)
Top panel (072H142A)
Side panel R (063H057)
Roland
JUPITER-6
End block L (072H140)
Keyboard SK-361C (004H008)
End block R (072H141)


Power switch 2wi XII (13149109)
Voltage selector switch ESE-3711 (13169503)
Voltage selector plate (063H056A)
XLR socket HA16R-3P (13439123)
Slide switch HSW0372-01-520 (13159322)
DIN socket TCS5350-01-1111 (13429615)
Roland
Chassis (061H147D)
AC socket
PA-126 (13429710) 100/117/220V
CM-3 (13429708) 240V
Jack HLJ4305-01-030 (13449226)
Jack HLJ0520-01-010 (13449126)
Jack HLJ0520-01-110 (13449125)

CIRCUIT DESCRIPTION

General


PANEL BOARD
POTs
SWs , LEDs
KEYBOARD
IC13
A/D
IC24
RAM
IC12
8031
8051
MASTER
CPU
CPU BOARD
SLAVE
CPU
IC6
8031
8051
D/A
S/H
VCO
VCF
VCA
VCA
2 VOICE MODULE BOARD
4 VOICE MODULE BOARD
JACK BOARD

The setting values of the potentiometers on the PANEL BOARDs are converted into digital equivalent by the A/D converter (IC13) on the CPU BOARD, and are read by the MASTER CPU (IC12). The setting values of the switchies on the PANEL BOARDs are directly read by the CPU through the Matrix circuits divided into the two PANEL BOARDs. The CPU (IC12) writes these data into RAM (IC24). The data in the RAM are read by control operation through the panel when required and are fed to the CPUs (SLAVE CPUs) on the MODULE BOARDs in serial format.

The SLAVE CPUs control VCOs, VCFs and VCAs using the data (tone data, keyboard information, etc.) coming from the MASTER CPU.

The BENDER and foot pedal controls are processed by analog circuits. The SLAVE CPUs gate the right analog switches to pass these control voltages to individual destinations to introduce additional features.

MASTER CPU

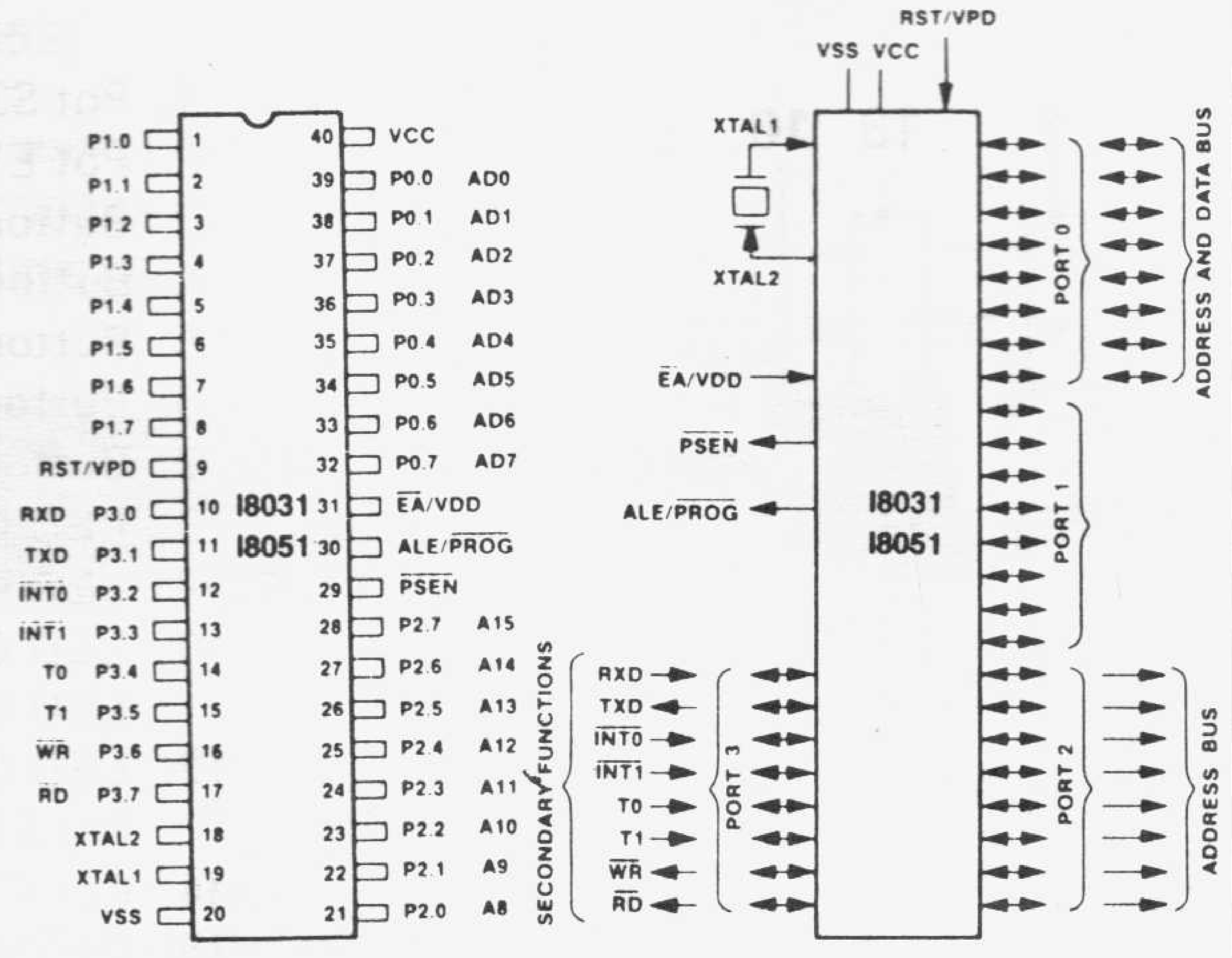
IC12 (CPU BOARD) P8031/P8051/P8051-318

Difference Between CPUs

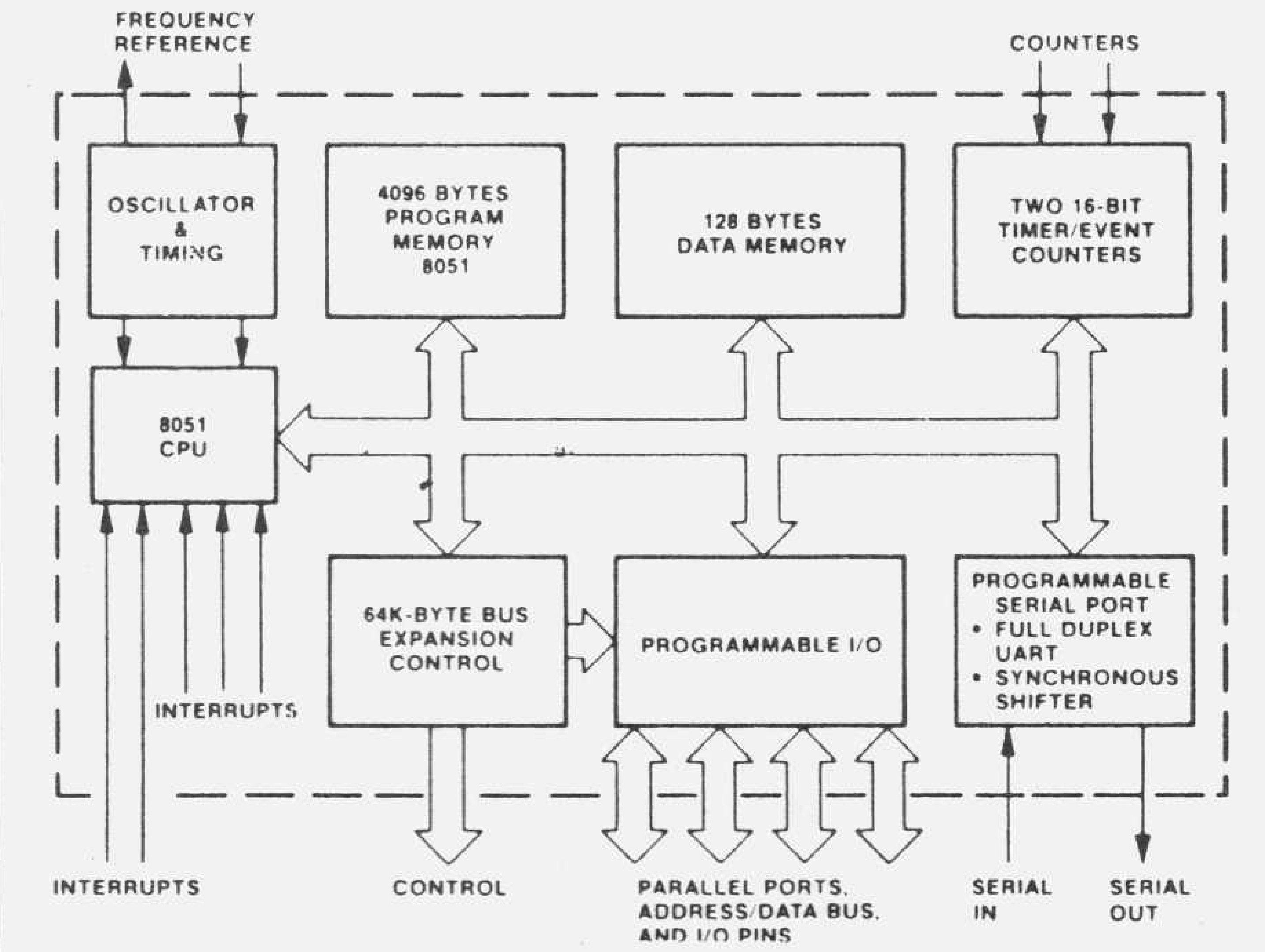
P8031	for early products, associated with PROM IC26 containing the operational program exclusive to the JP-6.
P8051	tentatively used. To be handled as P8031.
P8051-318	contains the program in the on-chip ROM, making IC26 redundant.

Compatibility

Three CPUs function the same as long as external PROM IC26 is enabled. Pulling up EA (pin 31) of P8051–318 will change programs from external to internal (see CPU circuit diagram), but this is unnecessary when IC26 operates perfectly.


P1.0 1
P1.1 2
P1.2 3
P1.3 4
P1.4 5
P1.5 6
P1.6 7
P1.7 8
RST/VPD 9
RXD P3.0 10
TXD P3.1 11
INT0 P3.2 12
INT1 P3.3 13
T0 P3.4 14
T1 P3.5 15
WR P3.6 16
RD P3.7 17
XTAL2 18
XTAL1 19
VSS 20
40 VCC
39 P0.0 AD0
38 P0.1 AD1
37 P0.2 AD2
36 P0.3 AD3
35 P0.4 AD4
34 P0.5 AD5
33 P0.6 AD6
32 P0.7 AD7
31 EA/VDD
30 ALE/PROG
29 PSEN
28 P2.7 A15
27 P2.6 A14
26 P2.5 A13
25 P2.4 A12
24 P2.3 A11
23 P2.2 A10
22 P2.1 A9
21 P2.0 A8
I8031
I8051
RST/VPD
VSS VCC
XTAL1
XTAL2
EA/VDD
PSEN
ALE/PROG
SECONDARY FUNCTIONS
RXD
TXD
INT0
INT1
T0
T1
WR
RD
PORT 3
PORT 0
PORT 1
PORT 2
ADDRESS AND DATA BUS
ADDRESS BUS

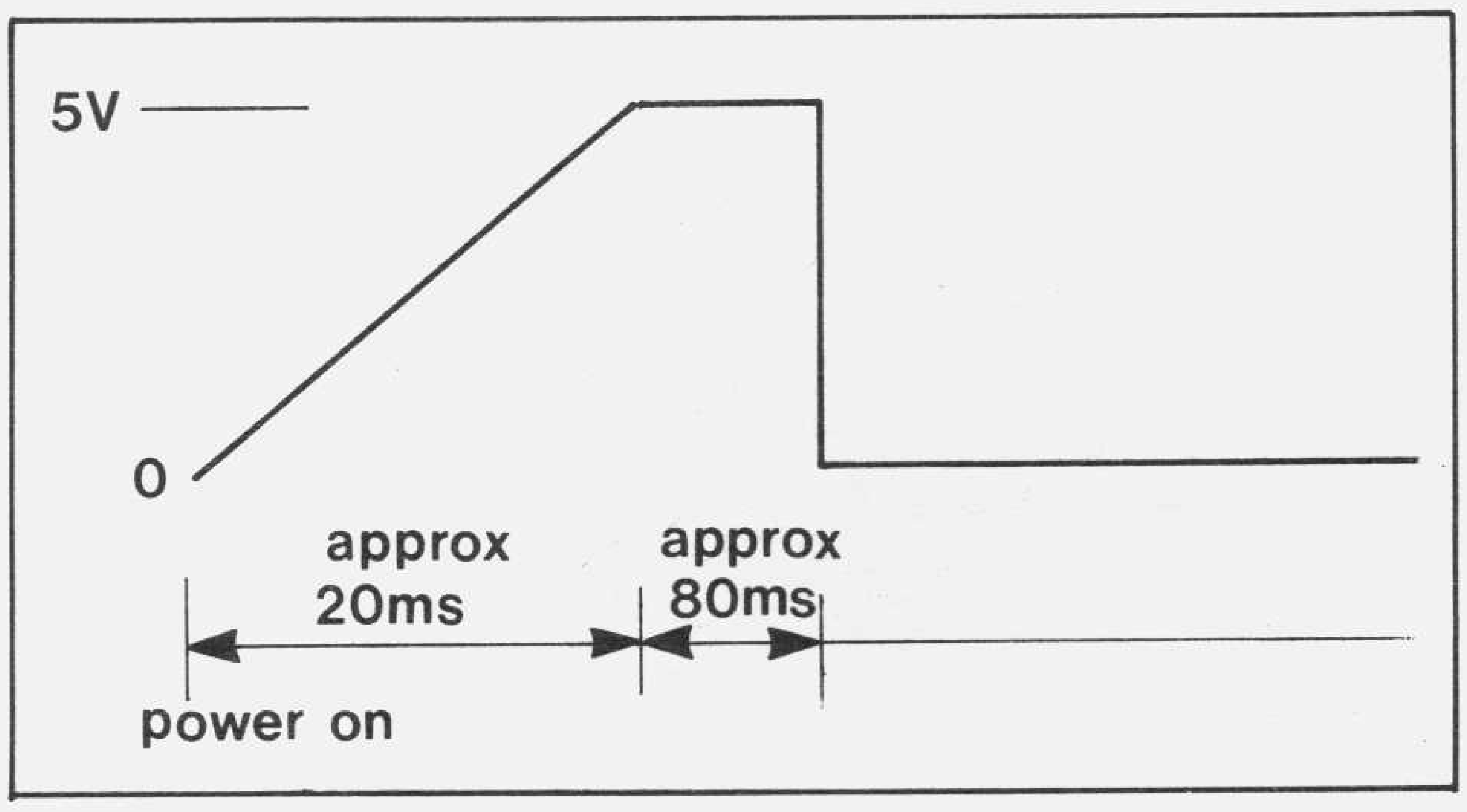
Pin Configuration Logic Symbol


FREQUENCY REFERENCE
COUNTERS
OSCILLATOR & TIMING
4096 BYTES PROGRAM MEMORY 8051
128 BYTES DATA MEMORY
TWO 16-BIT TIMER/EVENT COUNTERS
8051 CPU
64K-BYTE BUS EXPANSION CONTROL
PROGRAMMABLE I/O
PROGRAMMABLE SERIAL PORT
• FULL DUPLEX UART
• SYNCHRONOUS SHIFTER
INTERRUPTS
INTERRUPTS
CONTROL
PARALLEL PORTS, ADDRESS/DATA BUS, AND I/O PINS
SERIAL IN
SERIAL OUT

Block Diagram

Pin Function

RST ·············· The level of the reset terminal is kept high by RESET circuit (TR6, TR7, TR8 and IC21) for more than 24 clocks after the DC voltages becomes stable.



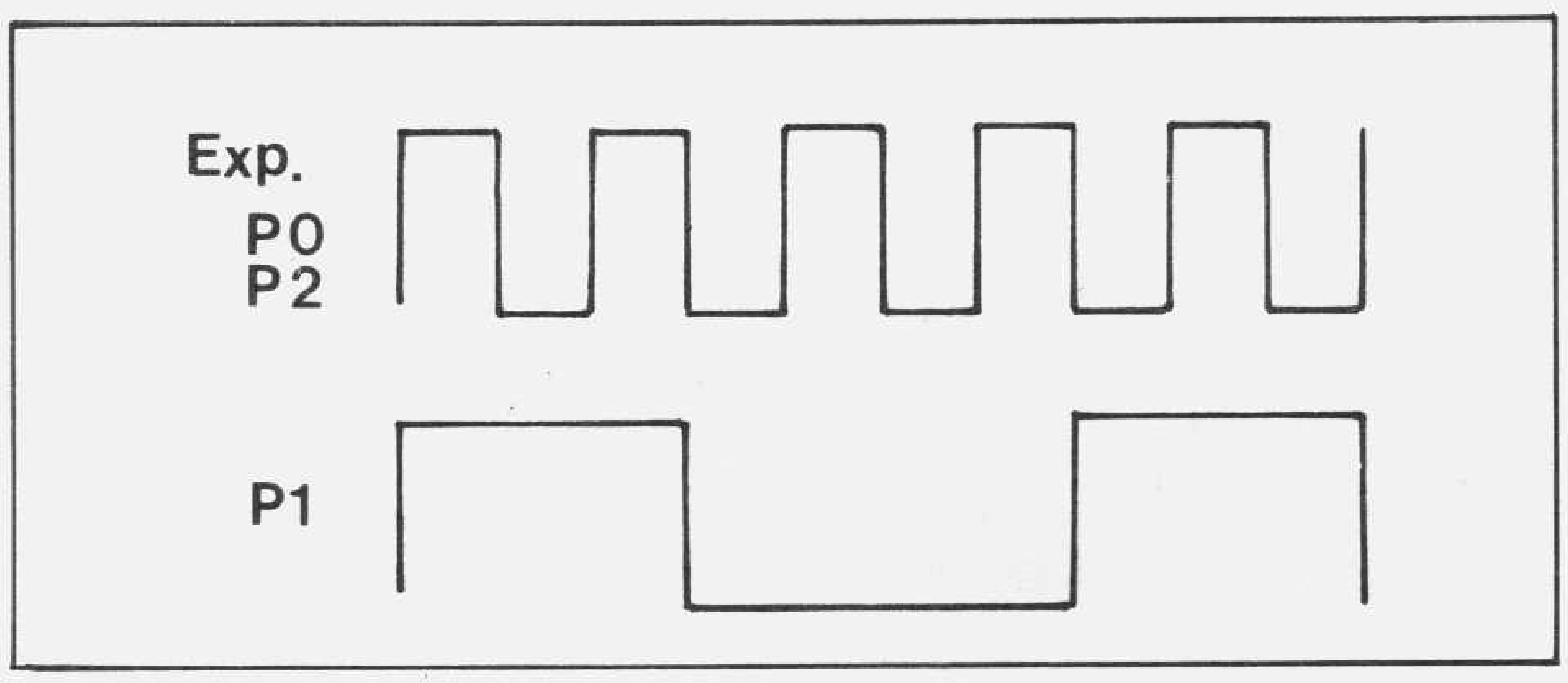
P0 ··············· carries data and address data.

ALE ·············· sends latch clock to IC17 to latch address off the P0 bus.

$\overline{\text{PSEN}}$ ············ enables IC26 to read a program in the PROM through the P0 bus.

P1 ················ serves as an I/O port.
It presents panel LED lighting, potentiometer and switch reading addresses.

P2 ················· issues addresses



$\overline{\text{RD}}$ ············· enables Read Address Decoder IC19 when the CPU wants to read necessary data. IC19 decodes select signals (P2.4-P2.6) and directs either of IC13, IC14, IC23, IC24, IC25 or IC27 to place data on the data bus.

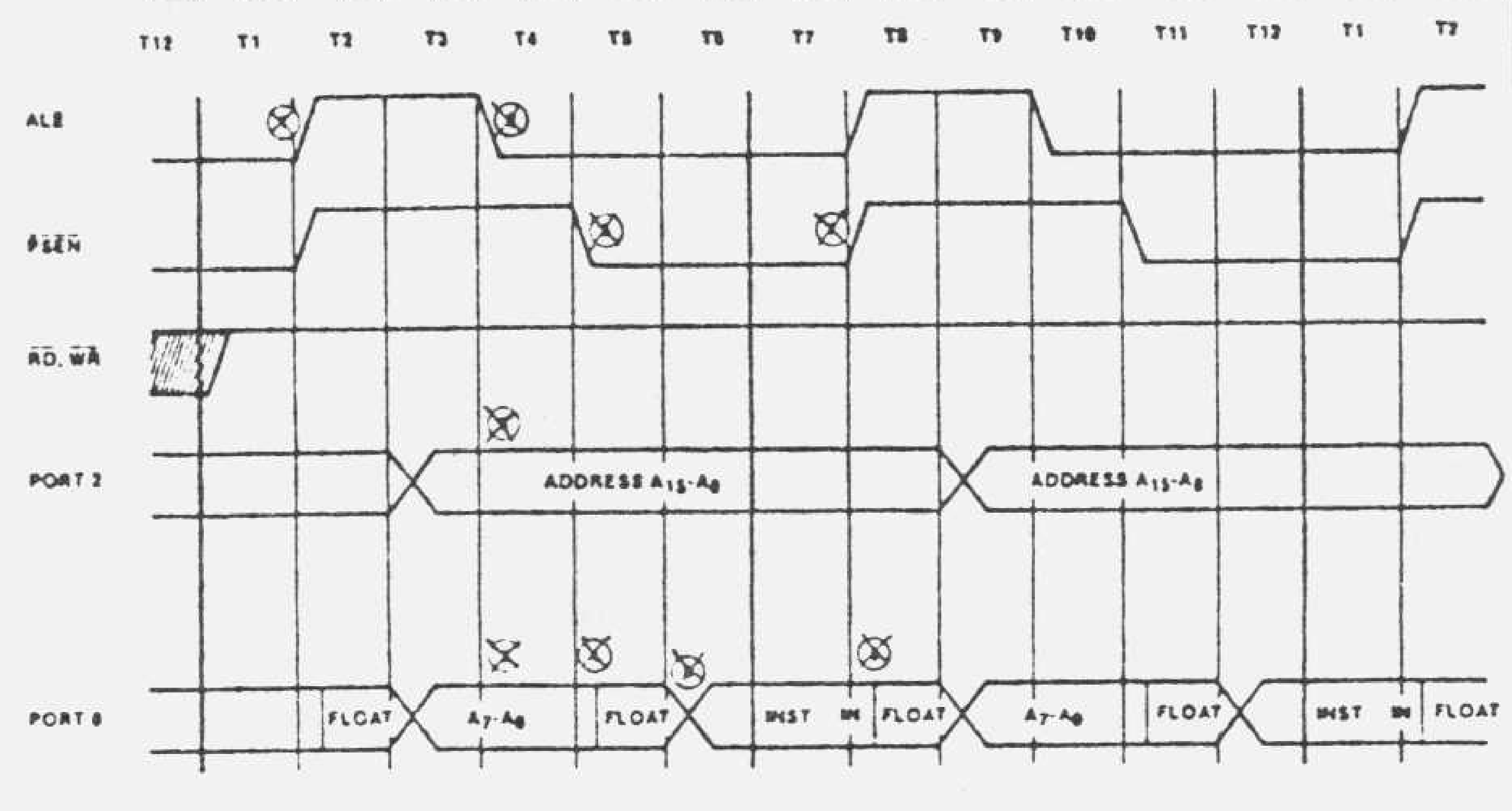
$\overline{\text{WR}}$ ··············· enables Write Address Decoder IC18 which, upon decoding address being fed, clocks RAMs, A/D converter (IC13) and LED driver (IC15, IC16).

T0, T1, TX ······ transmit data to the cassette tape interface, MIDI bus and SLAVE CPUs.

RX ················ reads data from MIDI bus.

INT 1 ············ reads data from the cassette interface.

INT 0 ············ not used.


OSC
T12
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T1
T2
ALE
PSEN
RD, WR
PORT 2
ADDRESS A15-A8
ADDRESS A15-A8
PORT 0
FLOAT
A7-A0
FLOAT
INST IN
FLOAT
A7-A0
FLOAT
INST IN
FLOAT

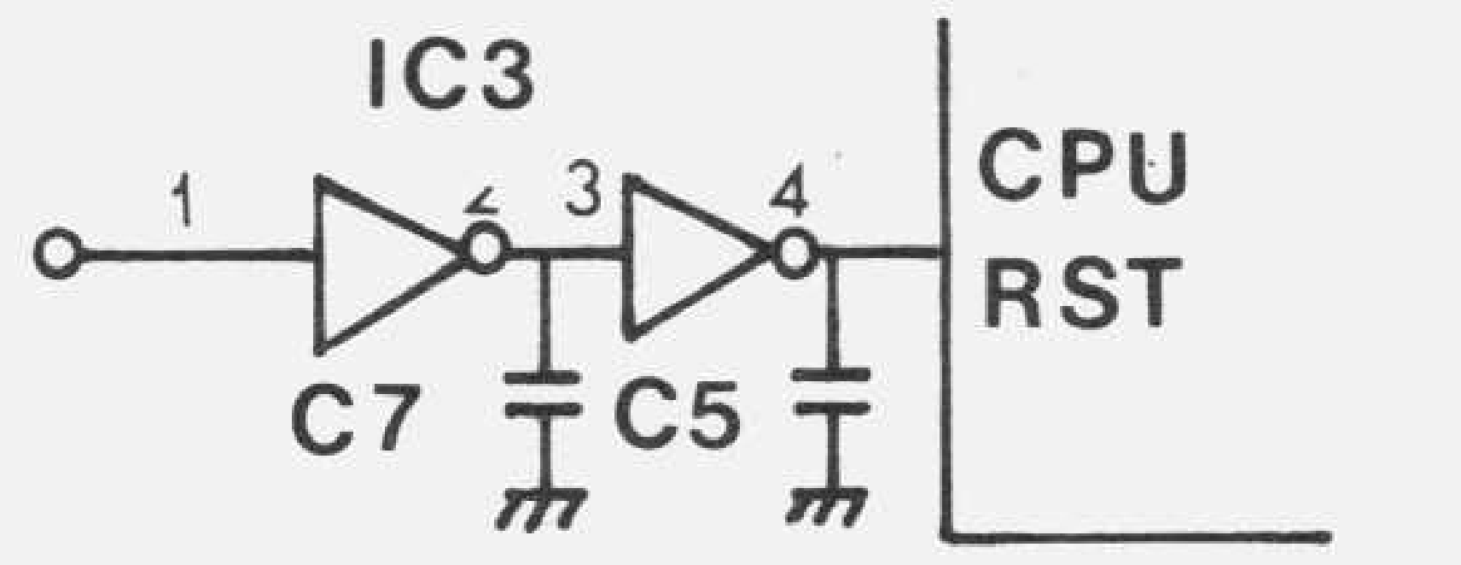
Program/Memory Read Cycle Timing

SLAVE CPU

IC6 (MODULE BOARD)

Compatibility ·· In the same way as IC12 on the CPU BOARD, P8031, P8051 or P8051-319 is used for the CPU (IC6). Refer to "MASTER CPU." P8051-319 makes IC1 and IC5 redundant.

RST ············· receives a shaped reset pulse from the CPU BOARD through buffers. The buffers (IC3) and capacitors (C5 and C7) effectively protect the CPU against static charge.


IC3
1
2
3
4
C7
C5
CPU
RST

P0, P2, $\overline{\text{PSEN}}$ and ALE ···· Refer to the description in the MASTER CPU section.

P1 ················ delivers addresses to the S/H analog switches.

$\overline{\text{RD}}$ and INT 1 ·· clock the address latches (IC7, IC8) to ON or OFF analog switches.

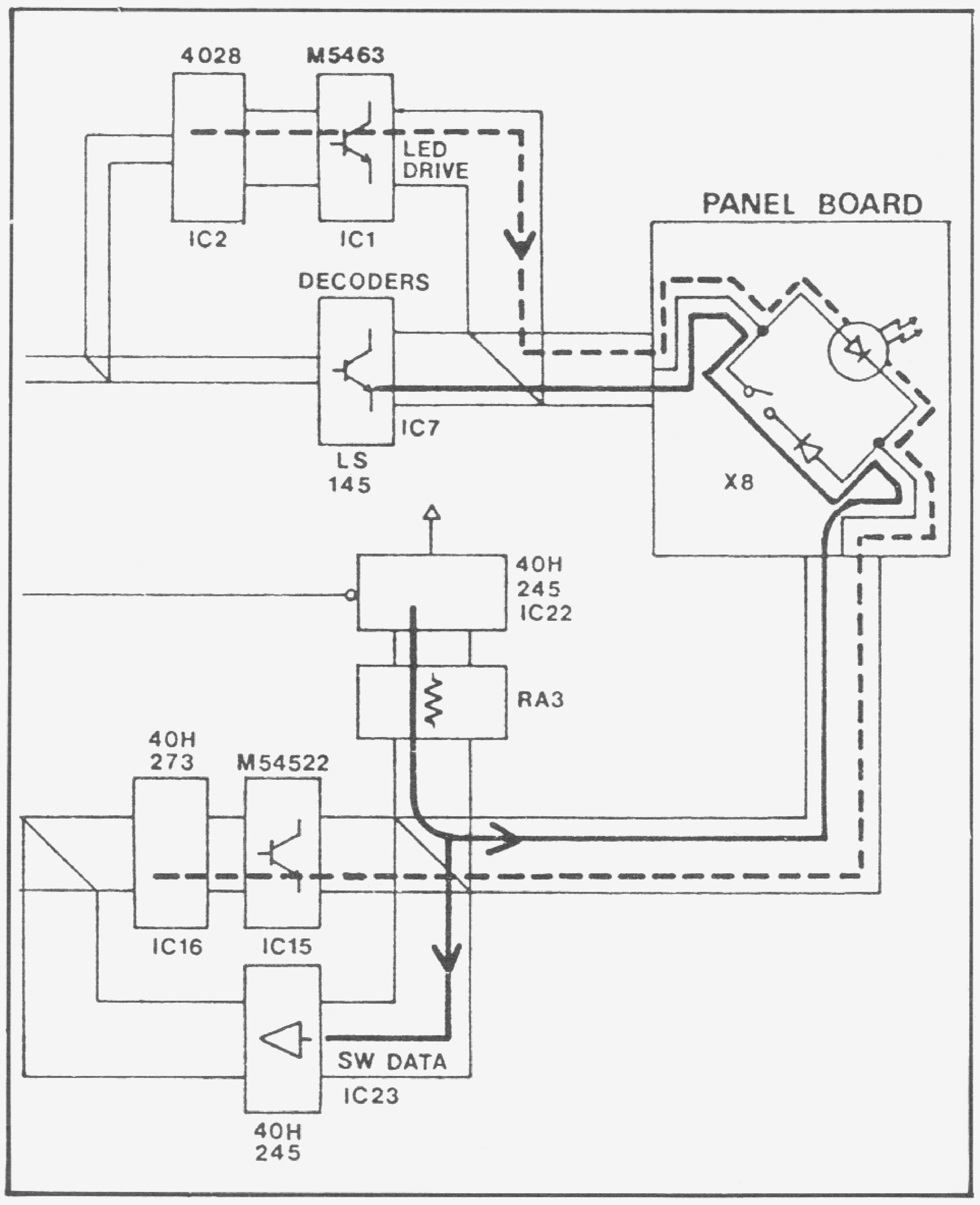
INT 0 ··········· reads the frequencies of the VCOs during computune operation.

RX ·············· accepts data from the MASTER CPU.

TX ················ goes high during Computune, signaling MASTER CPU not to send data.

T0, T1 ·········· transmit LFO-LED lighting signals, and transmit and receive LFO sync pulses to and from the other SLAVE CPU.

Reading switch states and driving LEDs



Reading switch states and driving LEDs are alternately repeated through 8 x 8 matrix (divided into the R and L PANEL BOARDs) using a single line.

1. **Reading panel switch states**

   Turned on by the CPU, IC22 pulls the bus positive through RA3. Simultaneously, a designated bit of IC7 is pulled low. A closed switch contact in the low bit effectively lowers one of input pins of IC23. The combination of bits (at IC7 output and IC23 input pins) informs the CPU which switch has been pressed not pressed.

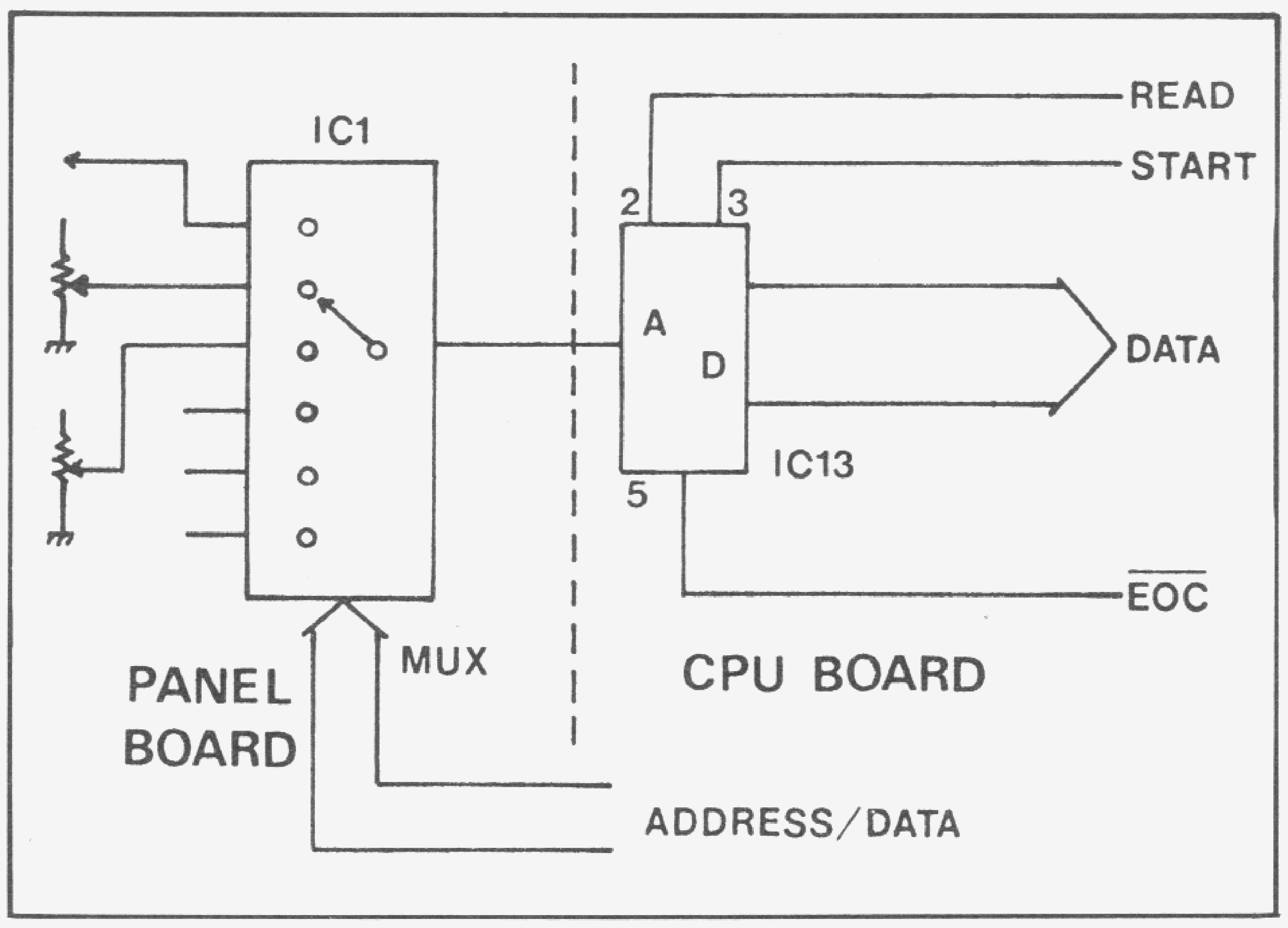
2. **Lighting LEDs**

   IC22 is turned off by the CPU and the bus is now in a float state. At this time, IC2 (4028) decodes the applied address and has a high at the corresponding output of LED driver IC1.
   When an output of IC16 goes high, a transistor in IC15 saturates, allowing one of the 8 LEDs (max) to be lit for 2ms.
   The above-mentioned operations, reading of panel switch states and lighting of LEDs, are repeated eight times (one cycle).

Reading potentiometer data

IC1 (Multiplexer) sequentially connects Panel potentiometers to IC13 (A/D converter). IC13 starts conversion when signaled by START derived from IC18 (Write Address Decoder) with $\overline{WR}$.

After A/D conversion, $\overline{EOC}$ of IC13 goes low to inform the CPU of completion of conversion. Upon receiving the $\overline{EOC}$, the CPU outputs READ to accept the digital equivalent of a control setting.



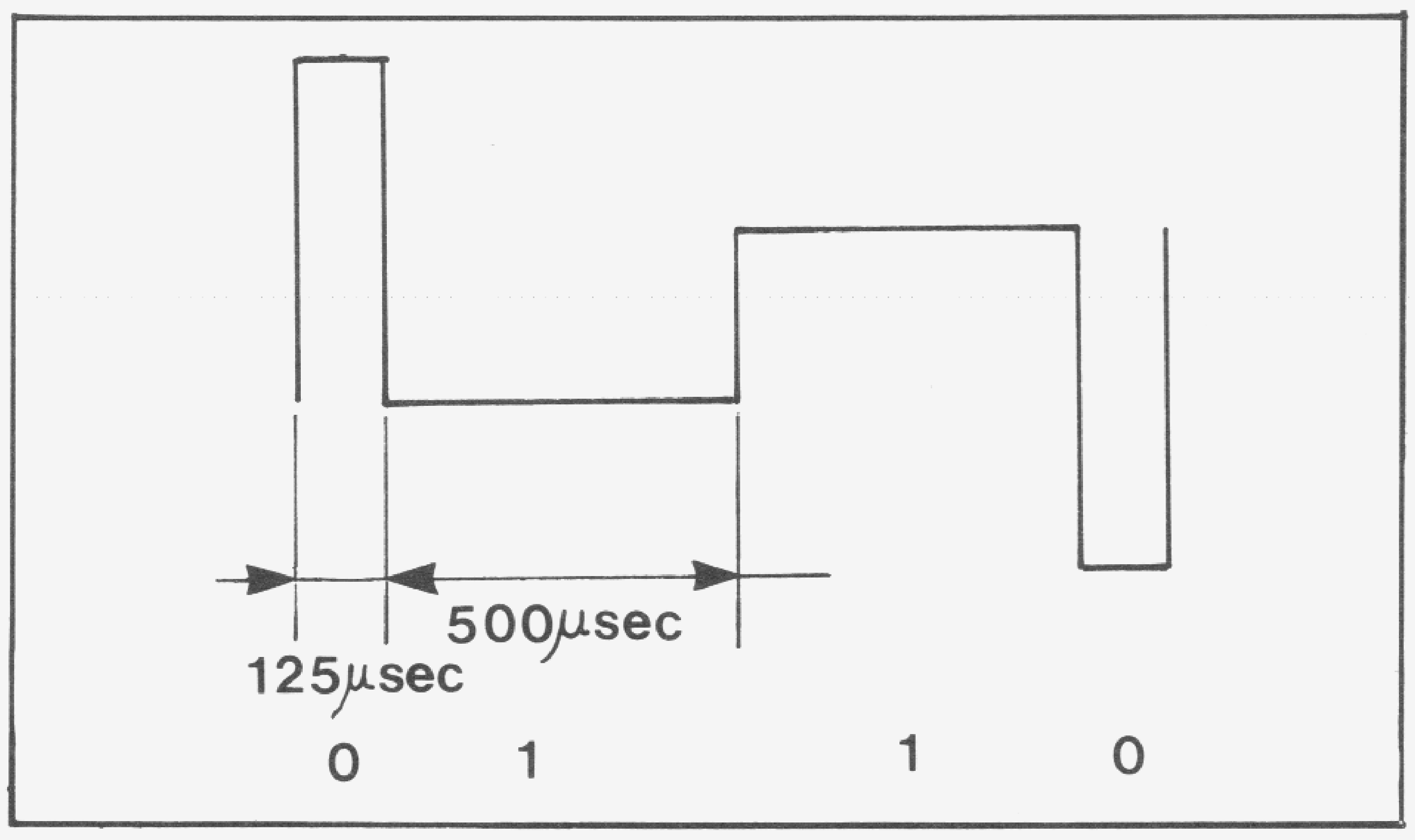
Cassette interface

SAVE

The CPU (IC12) converts data from the RAM (IC24) into two kinds of pulses with different widths (0 to 125μs and 1 to 500μs) as shown in the figure.
Accordingly, the average transmitting speed (signalling speed) is calculated as follows:

$$T = \frac{125 + 500\ (\mu s)}{2} = 312.5\mu s$$

$$\text{Thus}\quad \frac{1}{T(312.5)} = 3.2\text{k baud}$$



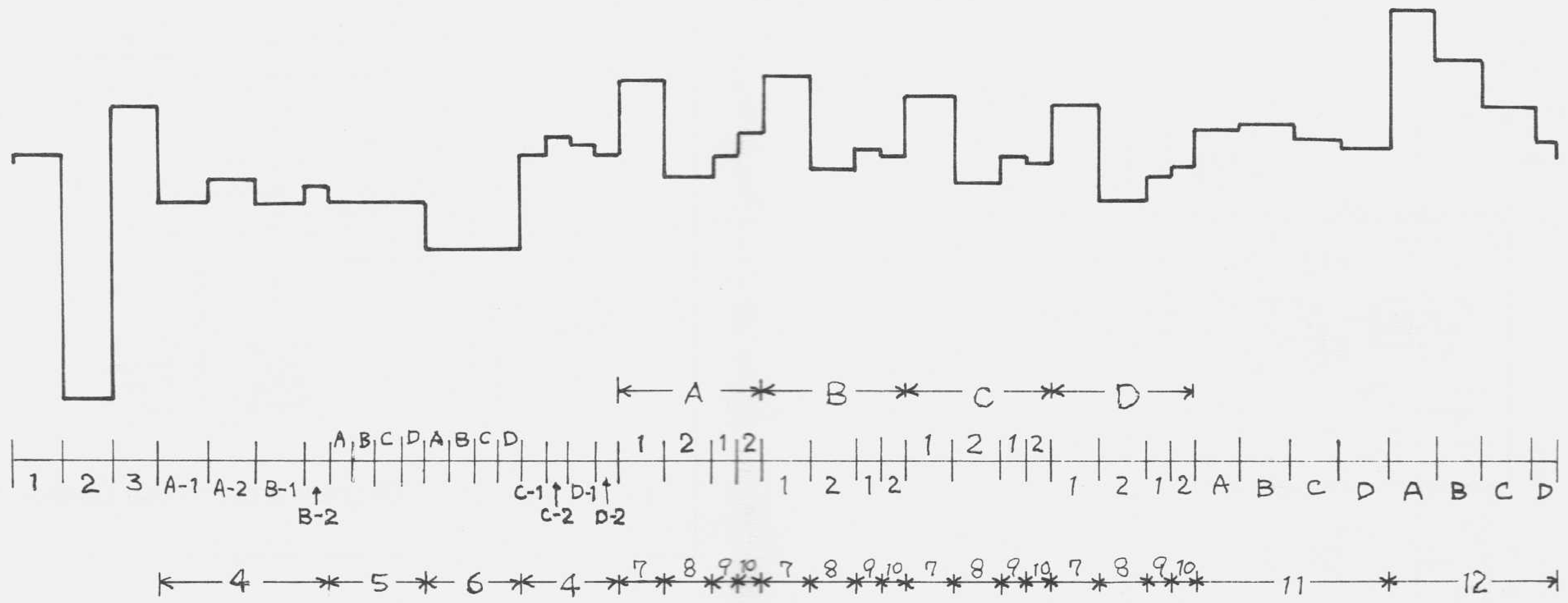
LOAD, VERIFY

IC4, TR2 and associated circuits shape the input signal from the cassette interface into a pulse wave. IC12 (CPU) reads the shaped waveform through INT 1 and measures the period between waveform edges to determine whether the data is 1 or 0.
When detecting an error by summation check, the program skips the block in which the error exists, lighting an indicator, then loads the next block. If there is no error through loading, the program returns to the normal mode. If an error occurs, error indicator(s) remain lit and the program cannot escape the TAPE mode until the TAPE button is pressed.

MODULE CONTROL VOLTAGE

The SLAVE CPU IC6 routes the data to IC11 and has the serial analog equivalents (CVs) at IC12 output, TP-1. Connect the scope to the TP-1 (TRIG on TP-4 signal). The figures exampled below will appear on the screen, taking altogether approx. 2.6ms with amplitudes about 10.7V maximum. (The amplitude of each waveform will, of course, greatly differ from actual display being determined by a control setting.)

These D/A outputs are commonly distributed to S/Hs and are individually sampled into and held at desired output of the S/H.



OUTPUT at TP-1

Contents at S/H Outputs
Numbers are keyed to numbers in the figure above and headings to designation of S/H outputs.

1.	MIX	Amount of MIX control.
2.	RESO	Amount of RESO control.
3.	M.VCA	Amount of VCA ENV-2 LEVEL and VCA LFO controls.

The above three controls are common to all the voices in a MODULE BOARD.

4.	WIDTH	Computune (width) data for each VCO, ideally approximately 5V. It may vary with the characteristics of the VCO IC. If the value greatly differs from the ideal value, the corresponding VCO is judged to be defective, unless the computune operation is improper.
5.	PWM	Amount of PWM controls (PW, PWM ENV-1 and PWM LFO) fro each VOICE (two VCOs).

Four (two) displayed waveforms will become distinguishable from each other when keys are played non-legato in POLY-1 with the following control settings:

PWM = 10; ENV-1: S = 10, R = 0, A and D = at small amount.

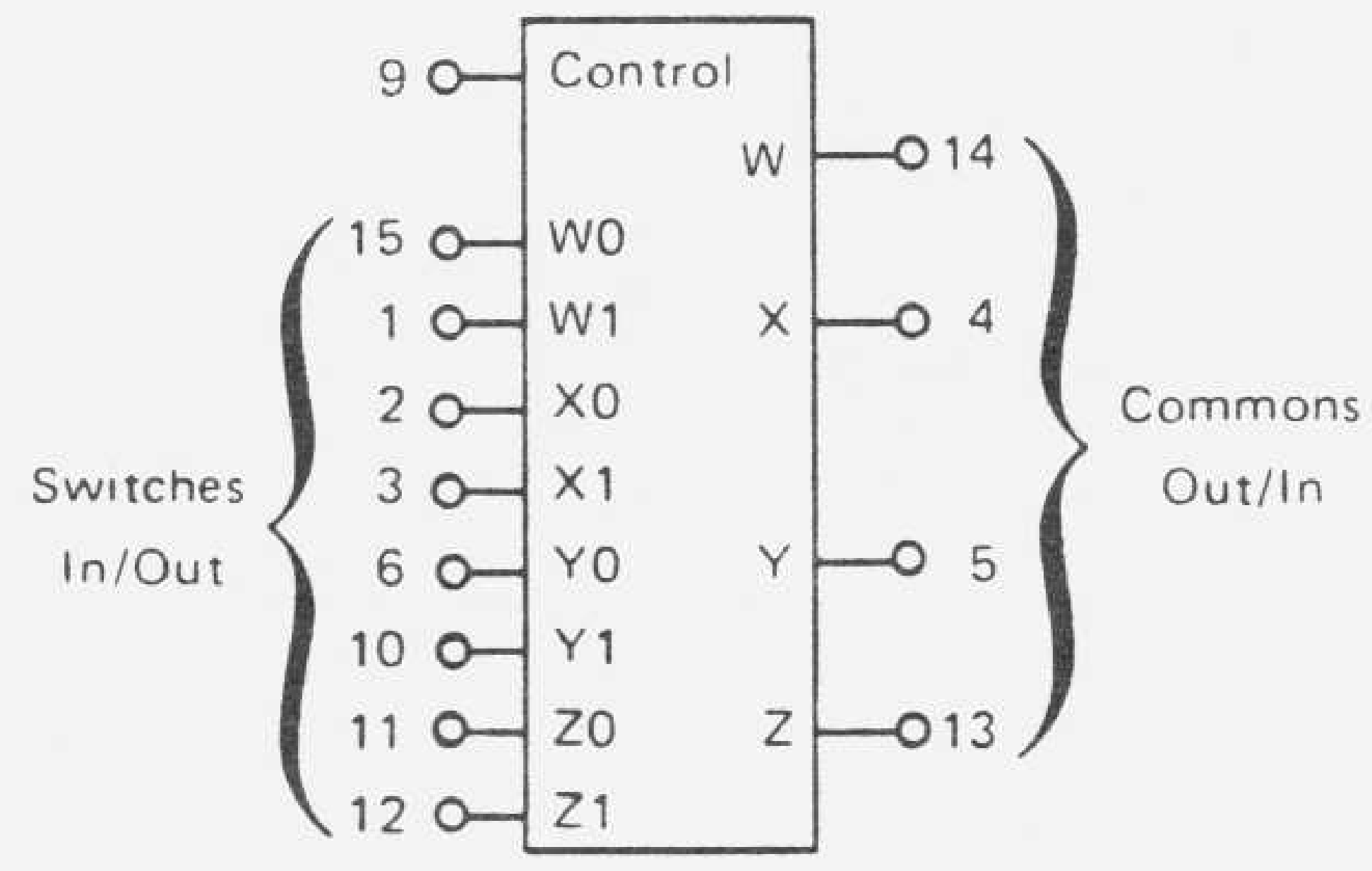
The settings are also applicable to 6.X–MOD and 11. VCF waveforms

6.	X-MOD	Amount of X-MOD controls (MANU, ENV–1).
7.	CV 1	Amount of CV (RANGE, LFO, KCV and TUNE) for VCO-1.
8.	CV 2	Amount of CV (the same parameters as for VCO-1) for VCO-2.
9.	FREQ 1	Computuned data (FREQ) and ENV MOD control for VCO-1.
10.	FREQ 2	Computuned data (FREQ) and ENV MOD control for VCO-2.
11.	VCF	Amount of controls (FREQ, ENV, LFO and KYBD) to determine a cutoff point of VCF.
12.	VCA	Amount of ENV-2 controls (A, D, S, R and K.F, except ENV-2 LEVEL) for the 1st VCA IC50.

IC DATA

MC14551B

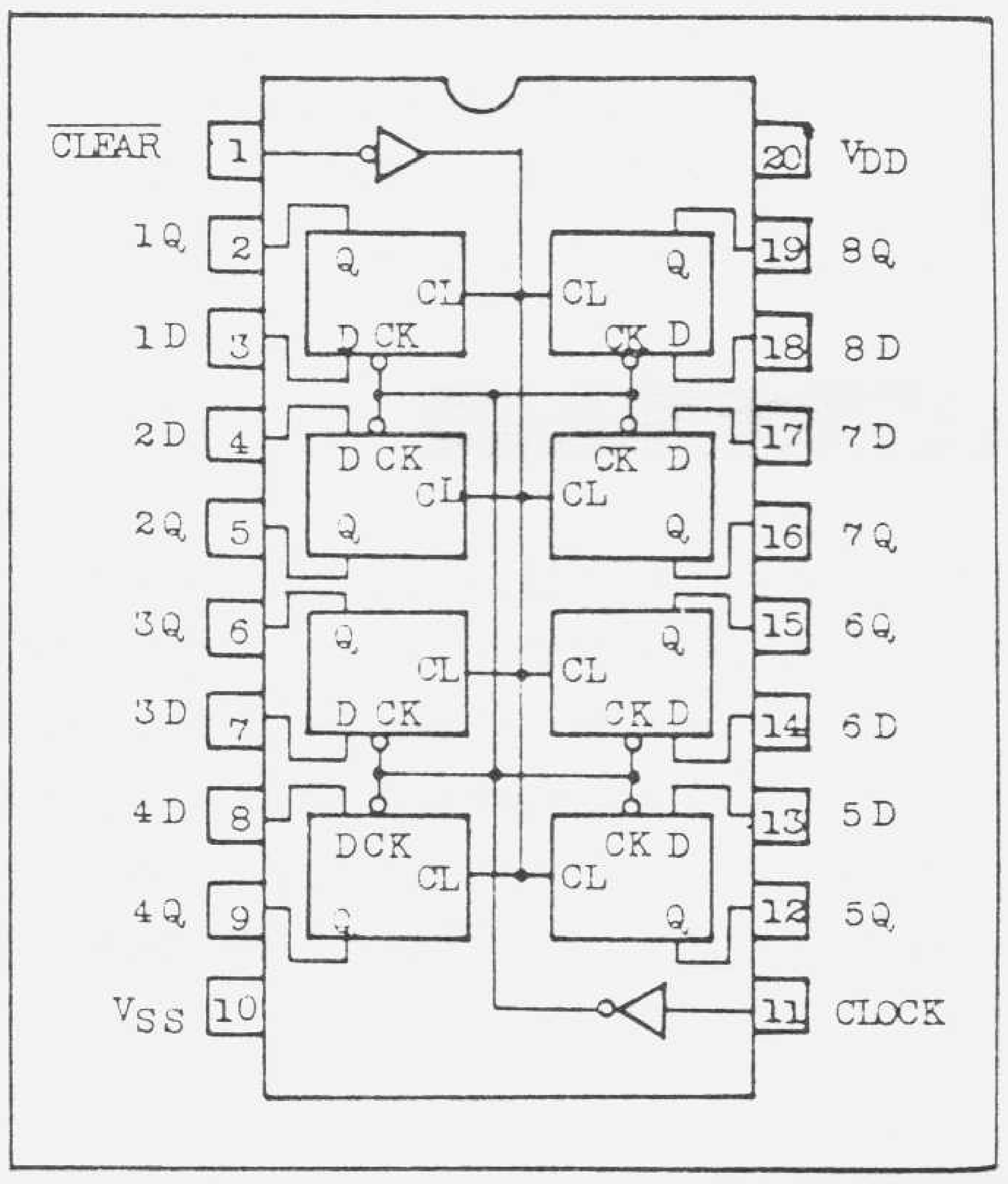
QUAD 2-INPUT
ANALOG MULTIPLEXER/DEMULTIPLEXER


9
Control
W
14
15
W0
1
W1
X
4
2
X0
3
X1
6
Y0
Y
5
10
Y1
11
Z0
Z
13
12
Z1
Switches
In/Out
Commons
Out/In

Control	ON
0	W0 X0 Y0 Z0
1	W1 X1 Y1 Z1

V_{DD} = Pin 16
V_{SS} = Pin 8
V_{EE} = Pin 7

Pin Configuration


CLEAR
1
1Q
2
1D
3
2D
4
2Q
5
3Q
6
3D
7
4D
8
4Q
9
VSS
10
20
VDD
19
8Q
18
8D
17
7D
16
7Q
15
6Q
14
6D
13
5D
12
5Q
11
CLOCK
Q
CL
D CK
CK D
CL
Q

TRUTH TABLE

INPUTS			OUTPUT
CLEAR	CLOCK	DATA	Q
L	*	*	L
H	↑	H	H
H	↑	L	L
H	L	*	Qo

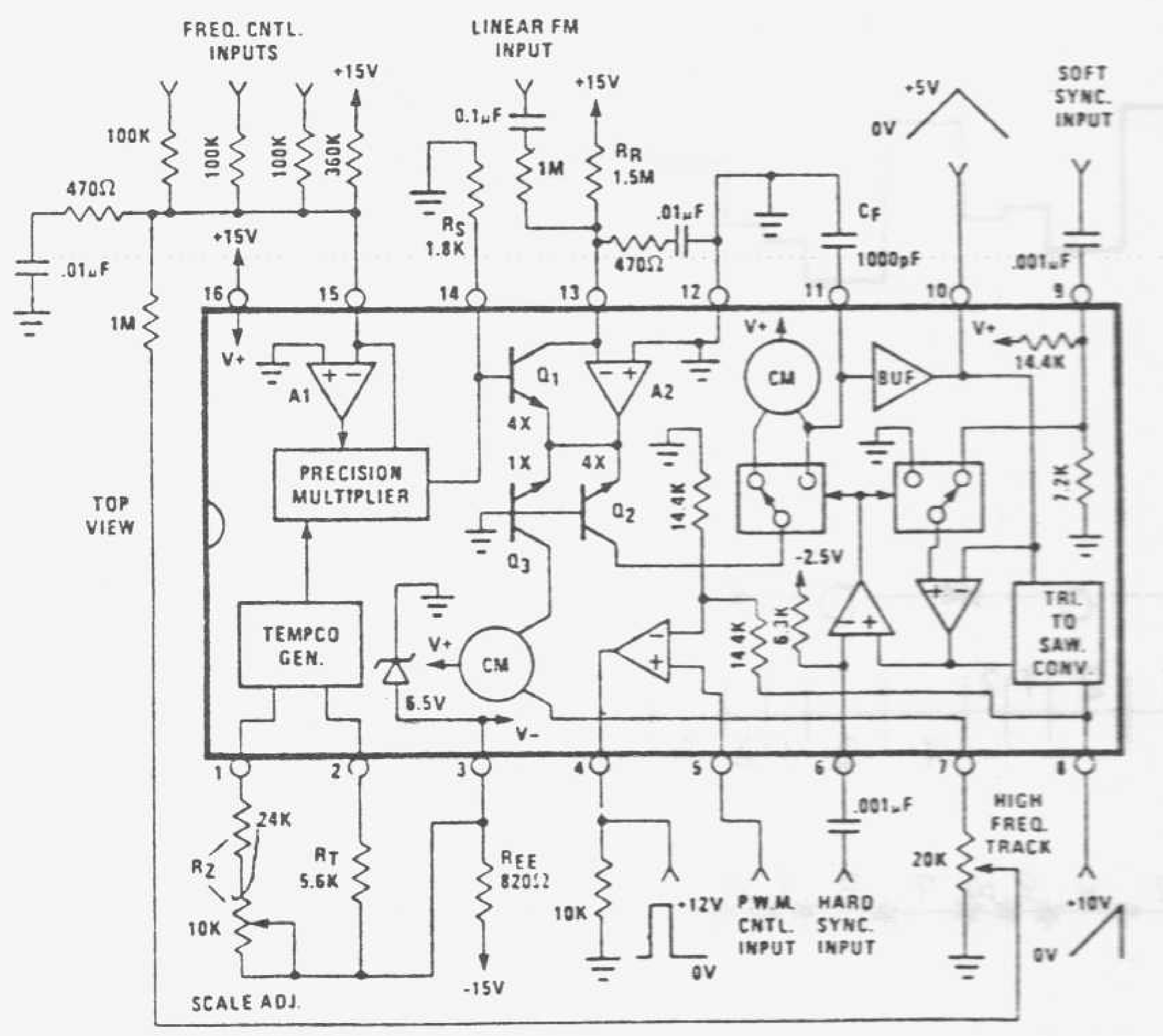
* = Don't care

Document scanning and editing by
Larry Hendry - www.wiseguysynth.com

MODULE BOARD

VCO

Each VCO (IC33, IC36) is composed of a single chip IC, CEM3340. Three waveforms from the VCO are unequal in amplitude, which is compensated in the next stage (IC34 or IC37) for uniformed levels. Synchronization with the associated VCO is accomplished by external connections, leaving the internal SYNC disabled.


FREQ. CNTL. INPUTS
LINEAR FM INPUT
+15V
100K
470Ω
.01µF
1M
360K
0.1µF
Rs 1.8K
RR 1.5M
.01µF
470Ω
CF 1000pF
+5V
0V
SOFT SYNC. INPUT
.001µF
16
15
14
13
12
11
10
9
V+
A1
PRECISION MULTIPLIER
Q1
Q2
Q3
4X
1X
A2
CM
BUF
14.4K
7.2K
TOP VIEW
TEMPCO GEN.
6.5V
V-
-2.5V
6.3K
TRI. TO SAW. CONV.
1
2
3
4
5
6
7
8
24K
Rz
10K
RT 5.6K
REE 820Ω
-15V
10K
+12V
0V
P.W.M. CNTL. INPUT
HARD SYNC. INPUT
.001µF
20K
HIGH FREQ. TRACK
+10V
SCALE ADJ.

CEM 3340 Circuit Block and Connection Diagram

COMPUTUNE

When the TUNE button is pressed, the sawtooth wave selected among the outputs from the VCOs by IC20 passes through the comparator (IC4) then to CPU (IC6). The CPU measures the frequency of the wave and delivers a corrected CV data for that VCO to D/A converter IC11. The CPU repeats the cycle for the remainder of VCOs.

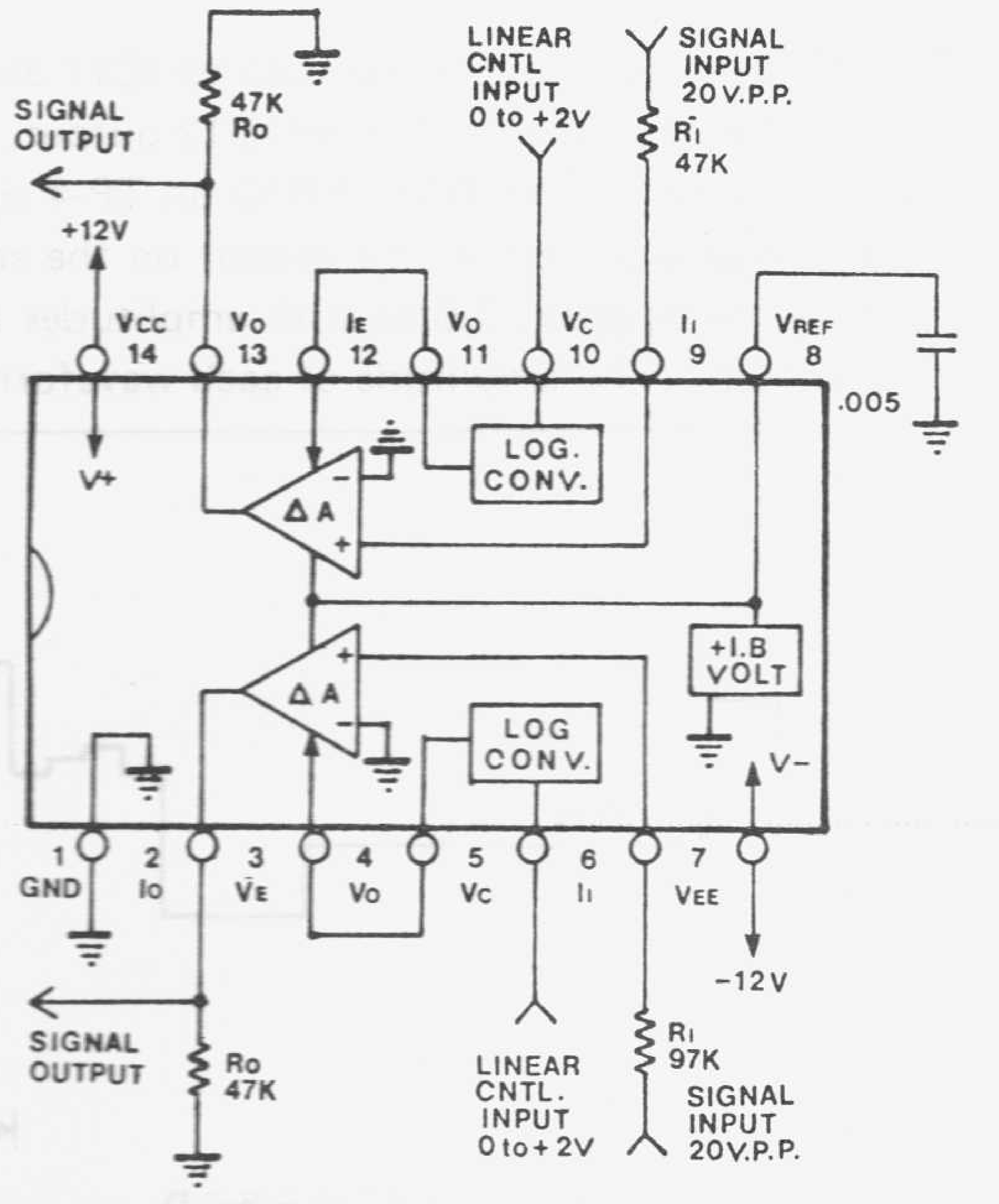
VCF

VCF is comprised of two seriese-connected filters of basically the some configuration. Each can function as either LPF or HPF of 12dB/oct slope when its output point is suitably selected.
Moreover the VCF will serve as a BPF by configuring one filter into LPF and the other HPF. In the JP-6 the 1st becomes HPF and 2nd LPF when VCF-MODE selectors are in BPF. Slight difference between two stages in circuit diagram illustrates compensation means for level and prevention against peak clips.

VCA

1st VCA

This device functions as a linear VCA accepting control signal through its linear control terminal.
The signal is called ENV–2, a combination of A, D, S, R and K.F data.

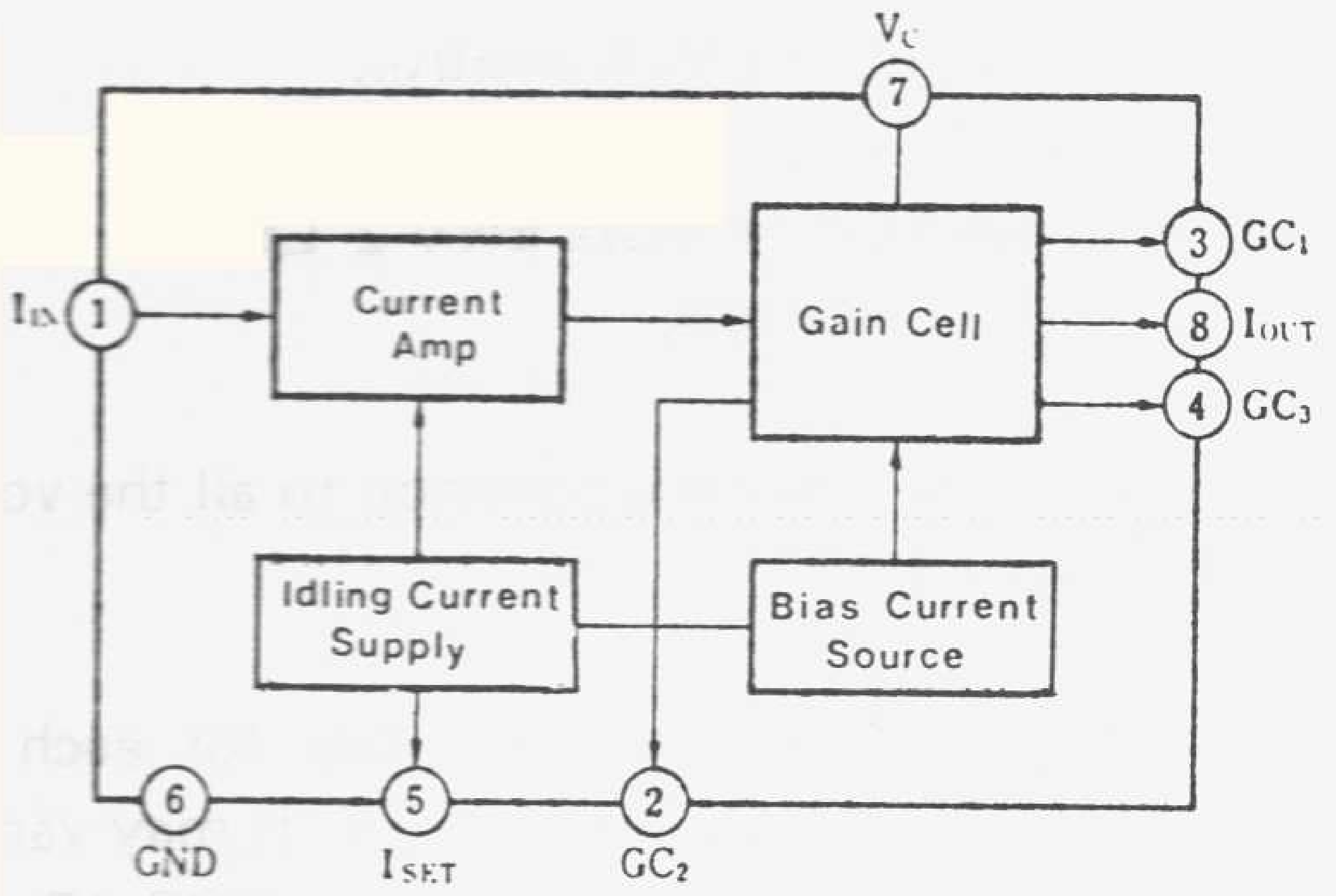

SIGNAL OUTPUT
47K Ro
LINEAR CNTL INPUT 0 to +2V
SIGNAL INPUT 20 V.P.P.
Ri 47K
+12V
Vcc 14
Vo 13
IE 12
Vo 11
Vc 10
Ii 9
VREF 8
.005
V+
ΔA
LOG. CONV.
+I.B VOLT
V-
1 GND
2 Io
3 VE
4 Vo
5 Vc
6 Ii
7 VEE
-12V
SIGNAL OUTPUT
Ro 47K
LINEAR CNTL. INPUT 0 to+2V
Ri 97K
SIGNAL INPUT 20V.P.P.

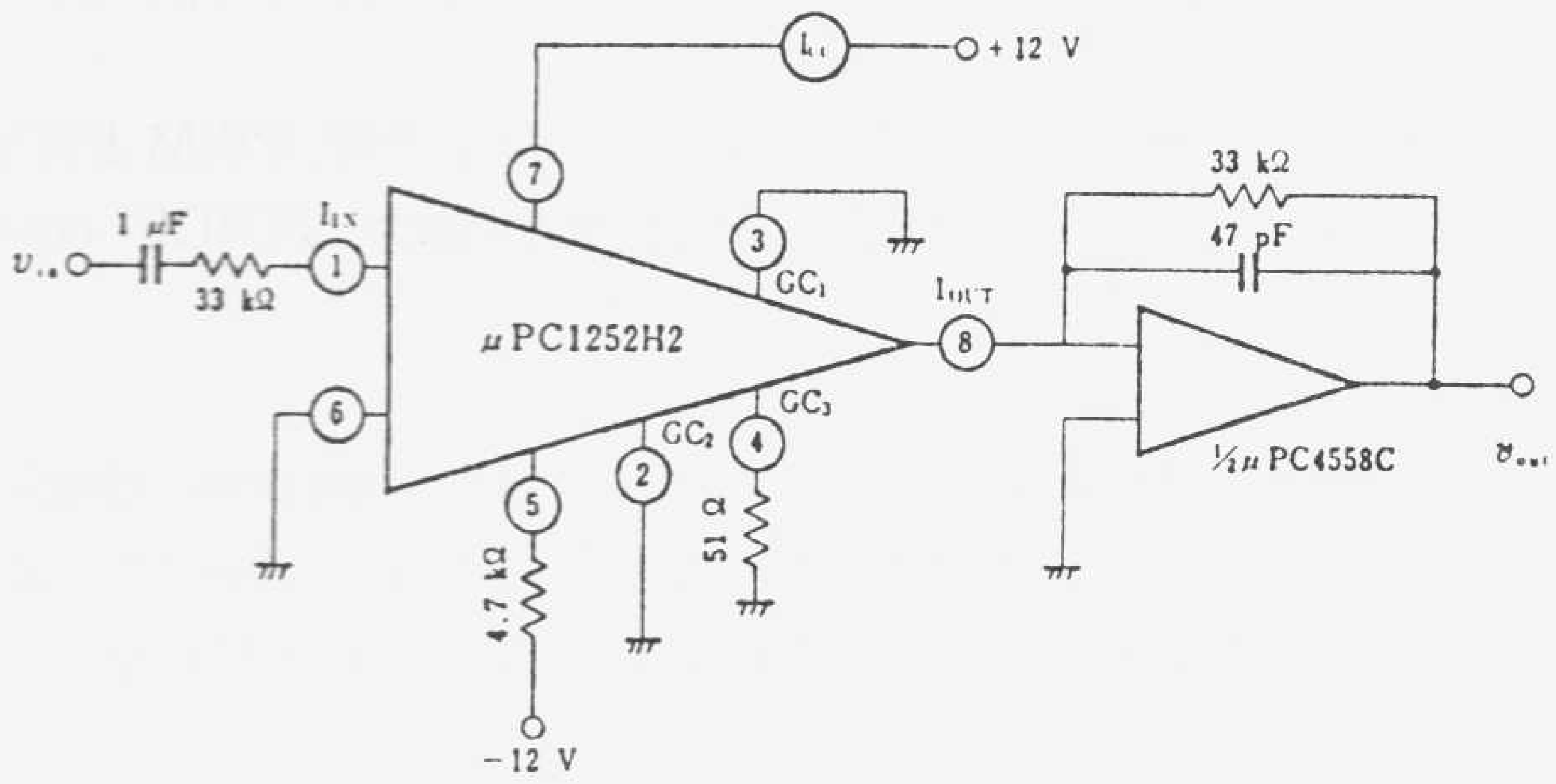
CEM 3360 Block Diagram and Typical Connection

2nd VCA

This device is controlled by the control knobs, VCA ENV-2 LEVEL and VCA LFO, and determines the entire output level of the MODULE BOARD.

Block Diagram


Vc
7
IIN 1
Current Amp
Gain Cell
3 GC1
8 IOUT
4 GC3
Idling Current Supply
Bias Current Source
6 GND
5 ISET
2 GC2


L1
+12 V
7
1 µF
33 kΩ
IIN
vin
1
3
GC1
IOUT
8
µPC1252H2
6
GC2
GC3
4
2
5
4.7 kΩ
51 Ω
-12 V
33 kΩ
47 pF
½µ PC4558C
vout

74LS145

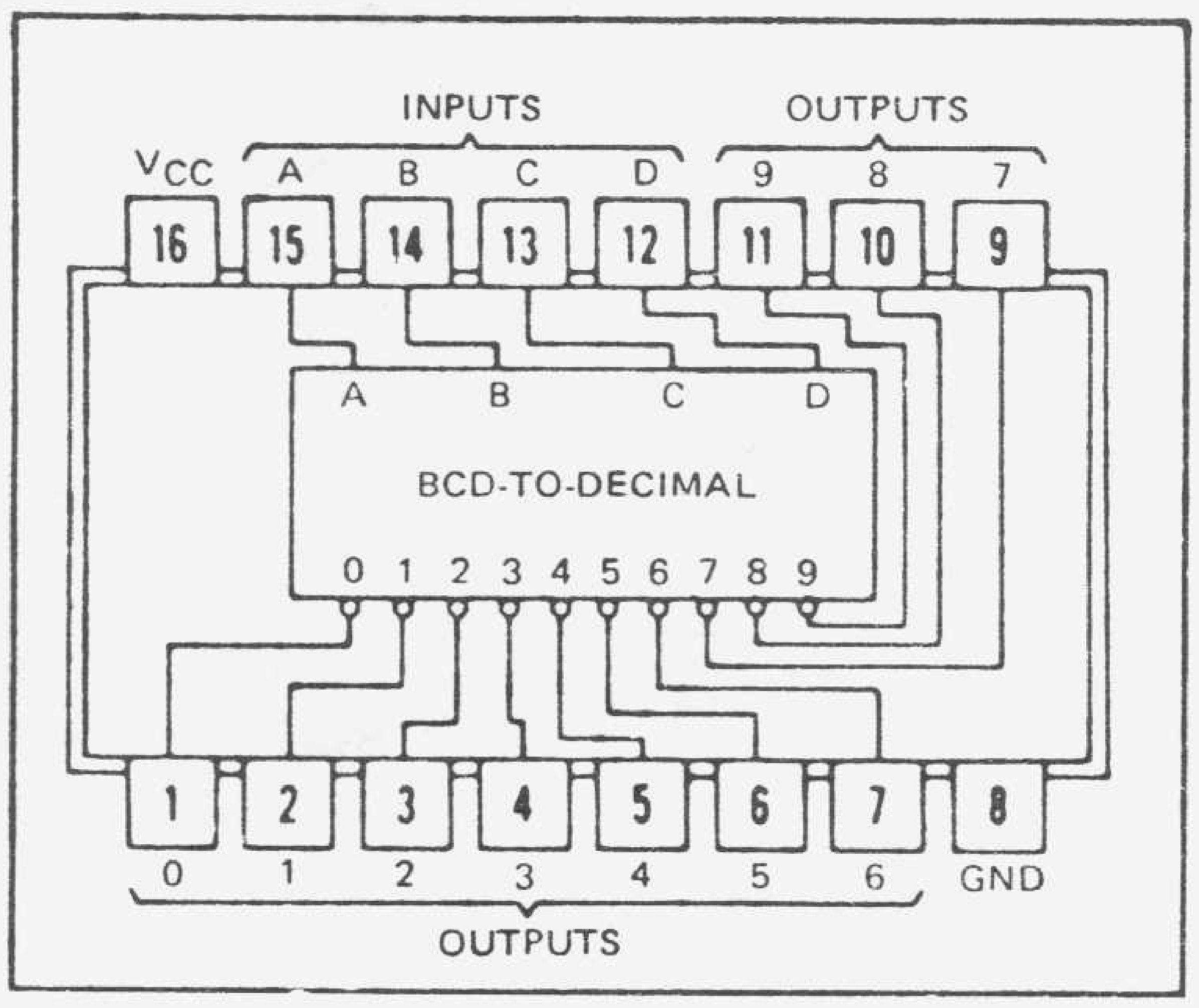
BCD-TO-DECIMAL DECODERS/DRIVERS

FUNCTION TABLE

NO.	INPUTS				OUTPUTS									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H
	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H = high level (off), L = low level (on)

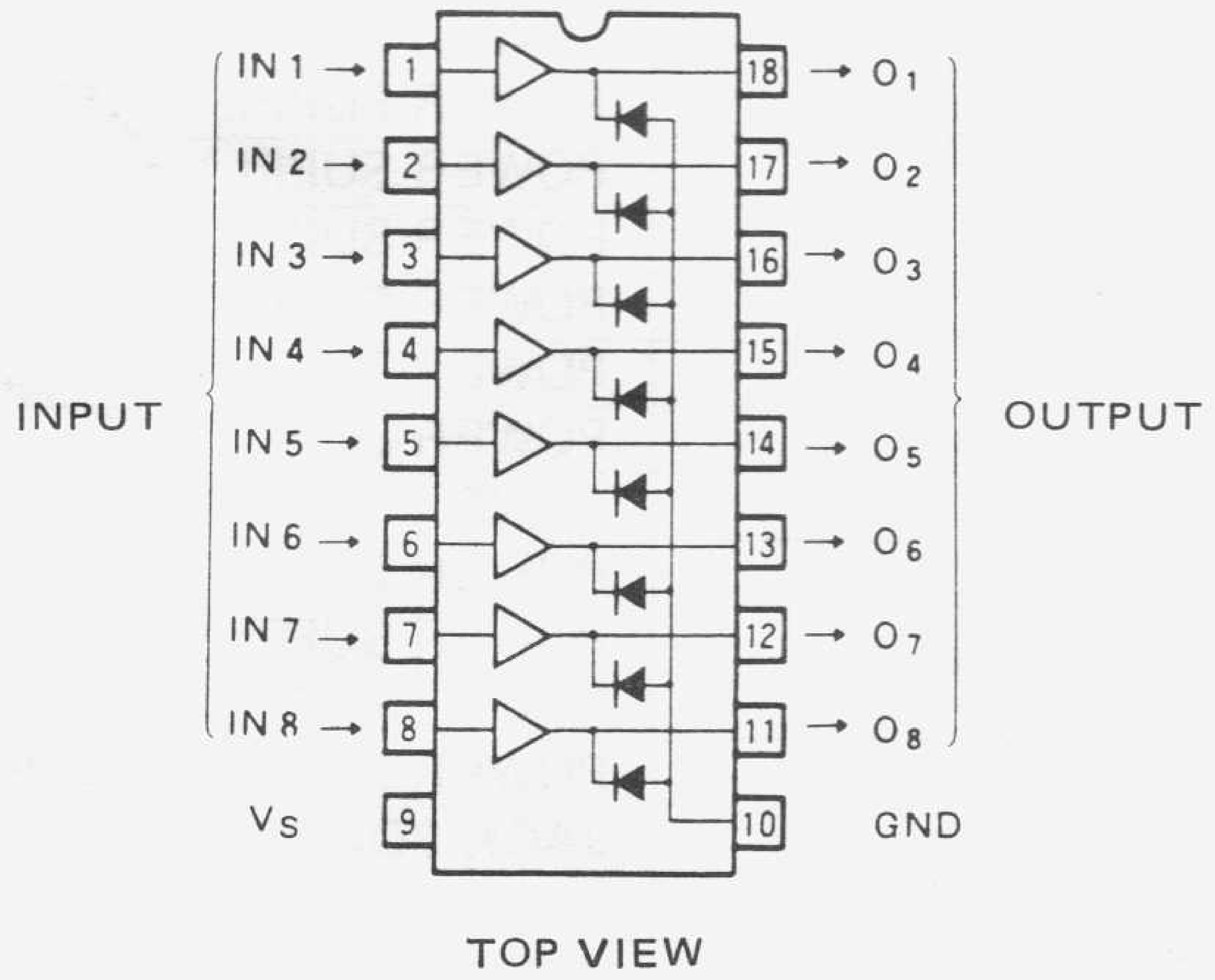
(TOP VIEW)


INPUTS
OUTPUTS
VCC
A
B
C
D
9
8
7
16
15
14
13
12
11
10
9
A
B
C
D
BCD-TO-DECIMAL
0 1 2 3 4 5 6 7 8 9
1
2
3
4
5
6
7
8
0
1
2
3
4
5
6
GND
OUTPUTS

M54563P

8 UNIT 500mA SOURCE TYPE DARLINGTON TRANSISTOR ARRAY

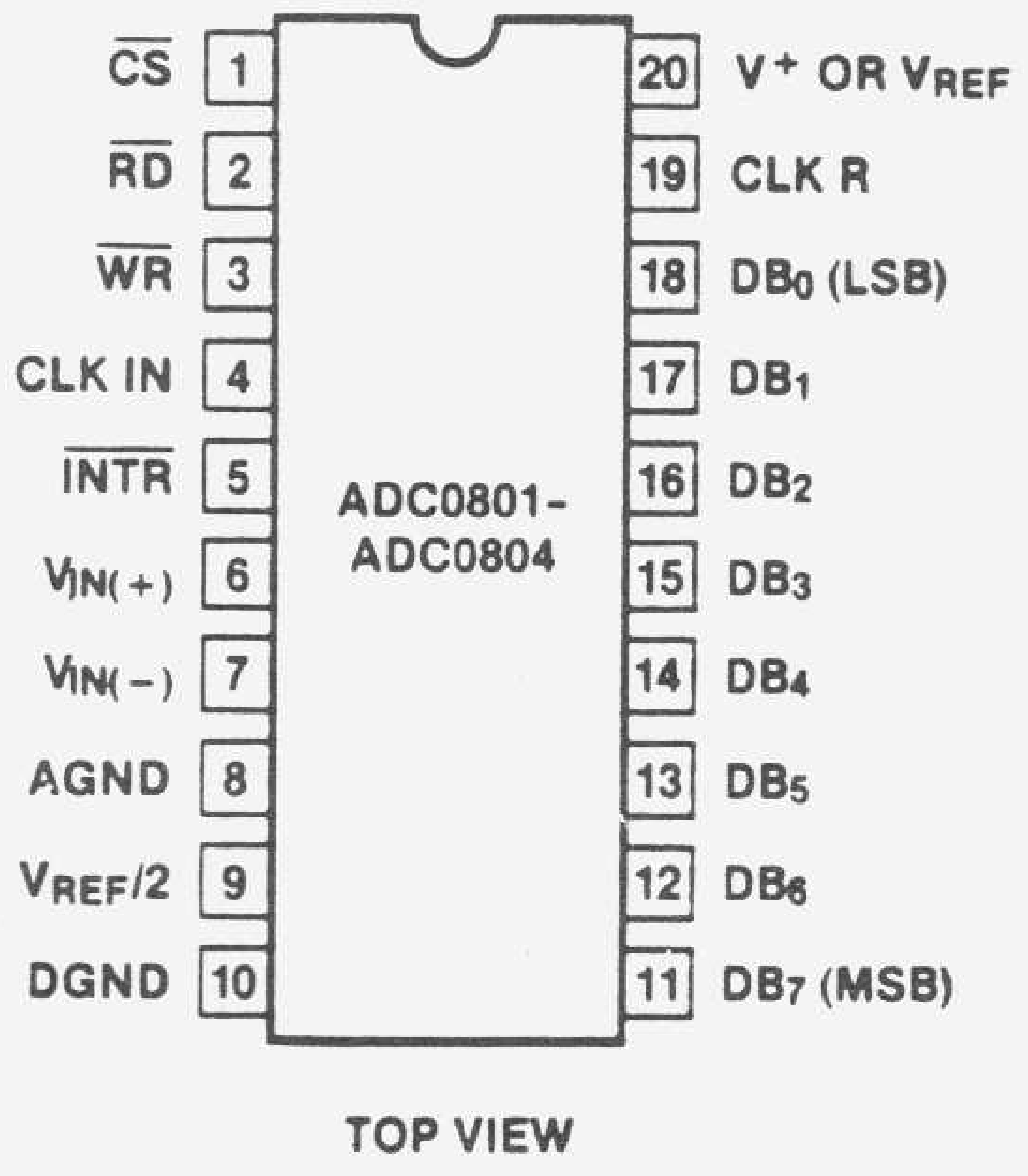
Pin Configuration


INPUT
IN 1
IN 2
IN 3
IN 4
IN 5
IN 6
IN 7
IN 8
Vs
1
2
3
4
5
6
7
8
9
18
17
16
15
14
13
12
11
10
O1
O2
O3
O4
O5
O6
O7
O8
GND
OUTPUT
TOP VIEW

ADC0803

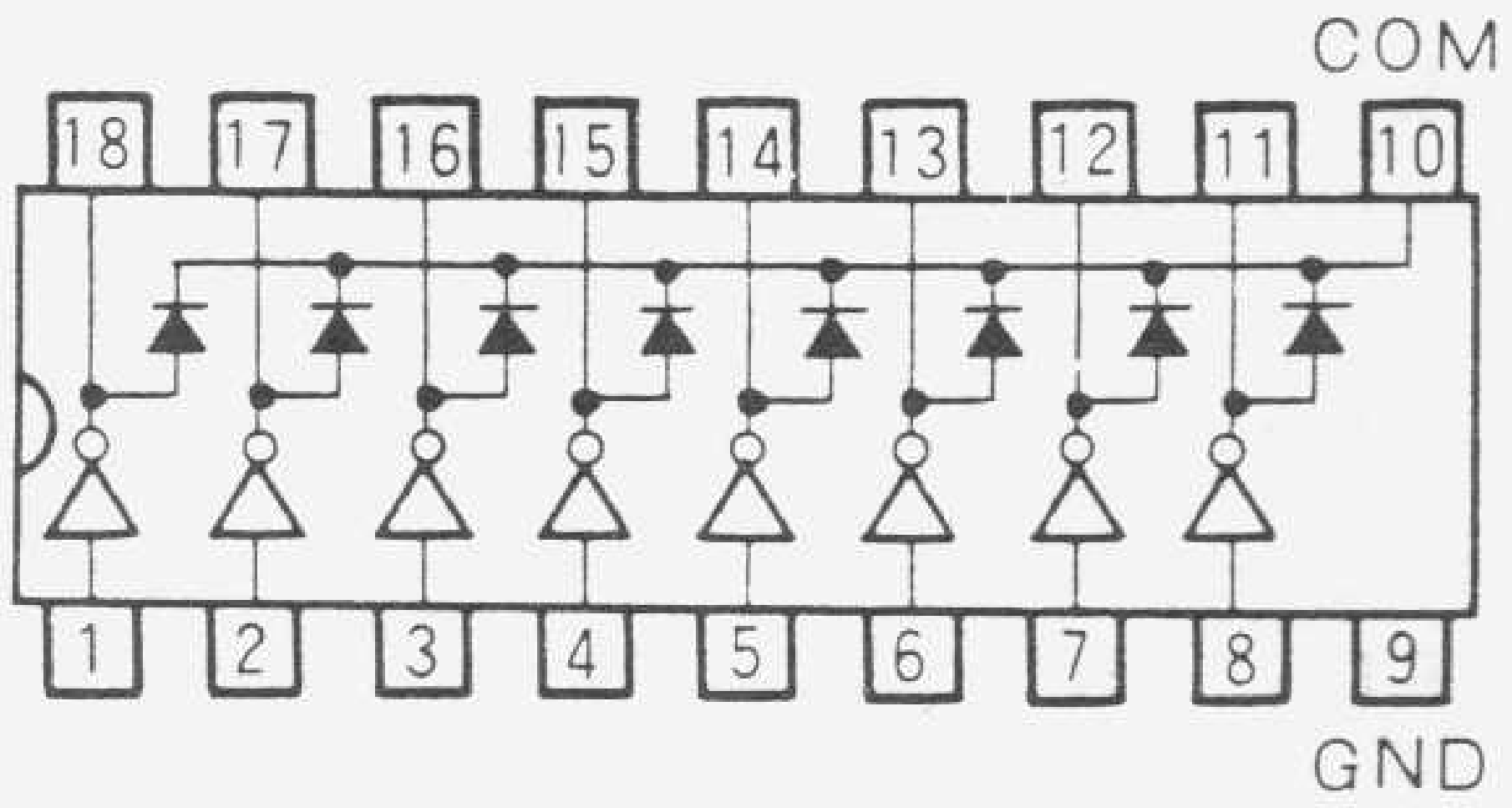
A/D Converters

Pin Configuration


CS
RD
WR
CLK IN
INTR
VIN(+)
VIN(−)
AGND
VREF/2
DGND
1
2
3
4
5
6
7
8
9
10
ADC0801-
ADC0804
20
19
18
17
16
15
14
13
12
11
V+ OR VREF
CLK R
DB0 (LSB)
DB1
DB2
DB3
DB4
DB5
DB6
DB7 (MSB)
TOP VIEW

M54522P

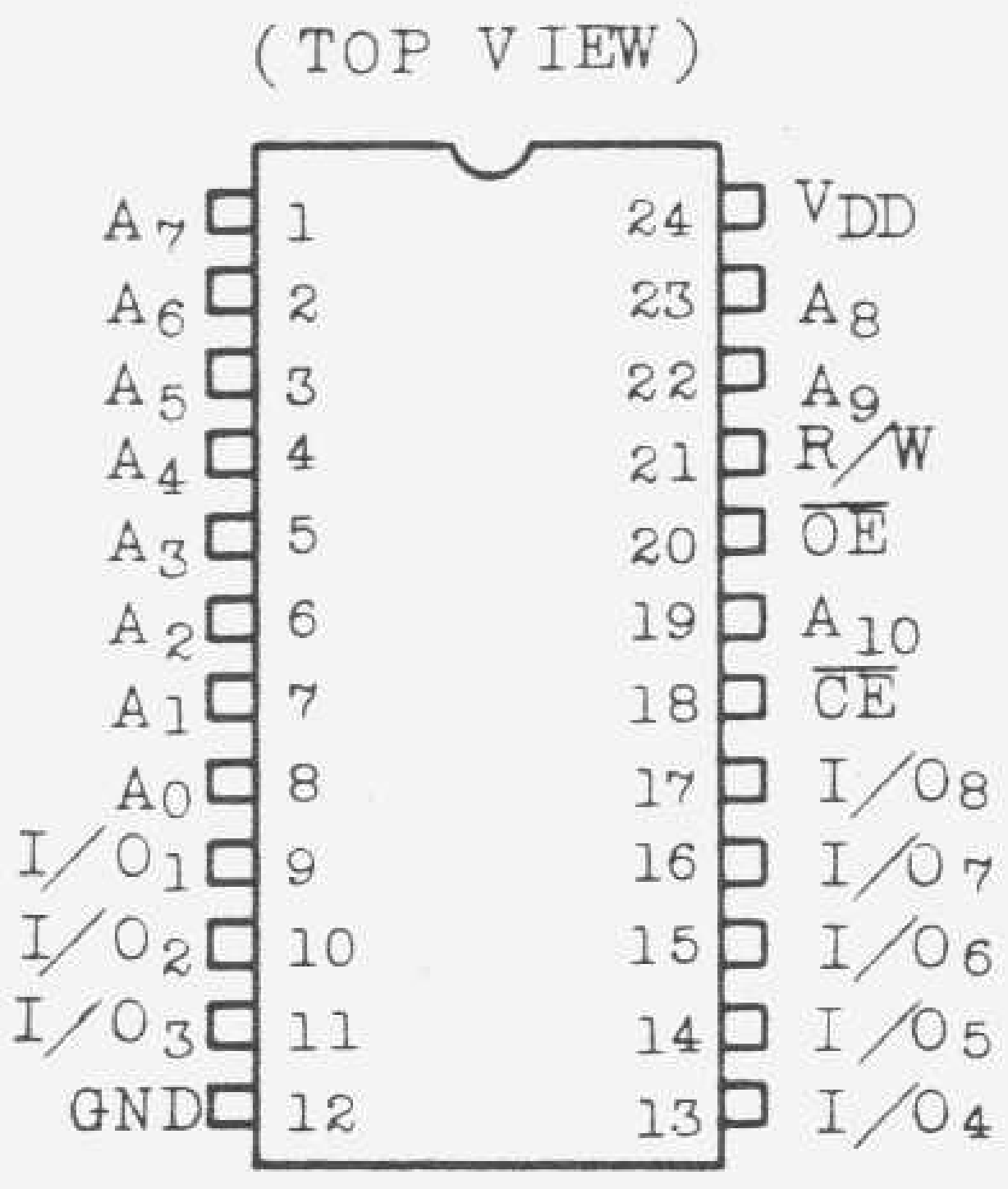
Pin Configuration


COM
18
17
16
15
14
13
12
11
10
1
2
3
4
5
6
7
8
9
GND

TOP VIEW

TC5517AP TC5517APL

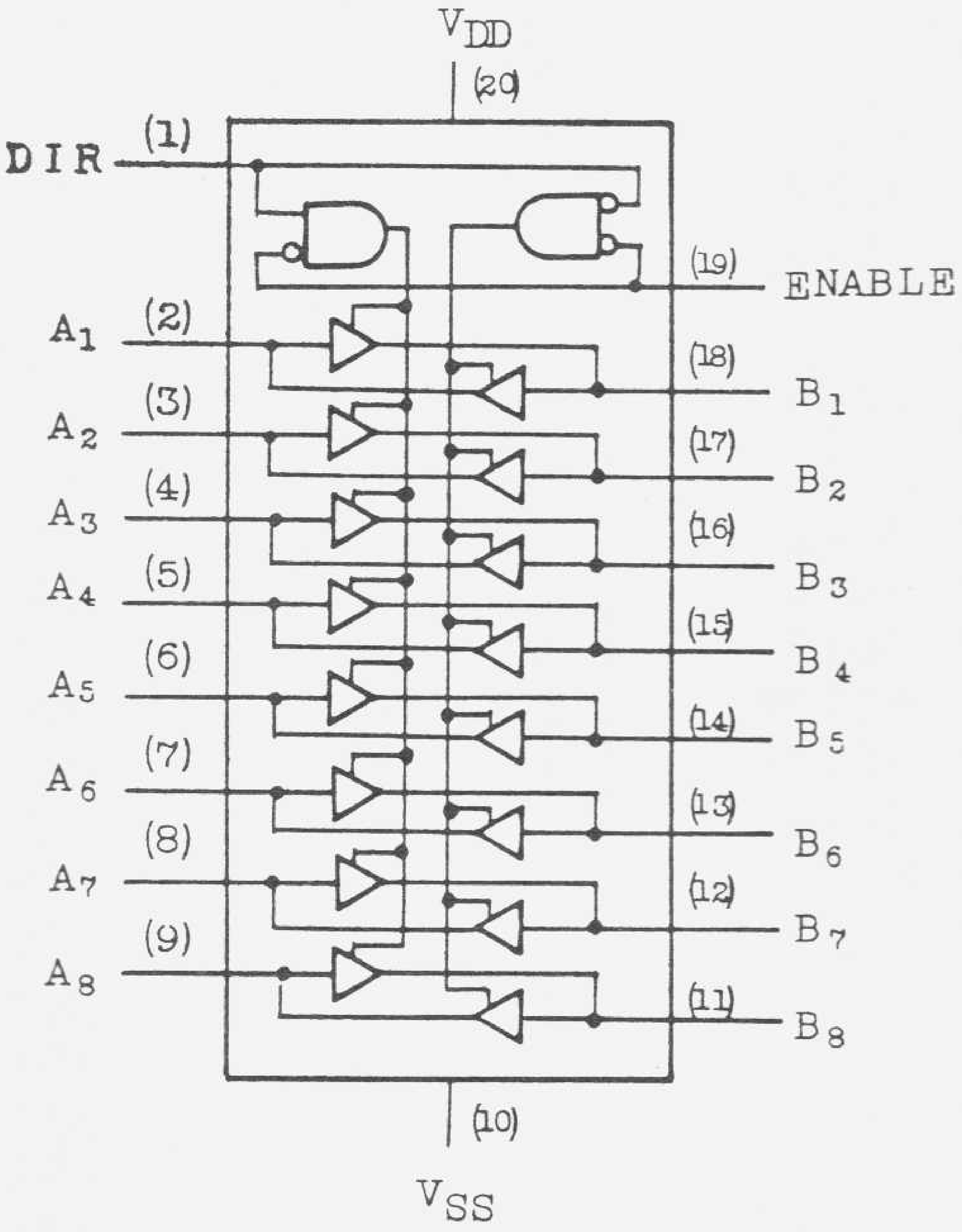
Pin Configuration


(TOP VIEW)
A7 1
A6 2
A5 3
A4 4
A3 5
A2 6
A1 7
A0 8
I/O1 9
I/O2 10
I/O3 11
GND 12
24 VDD
23 A8
22 A9
21 R/W
20 OE
19 A10
18 CE
17 I/O8
16 I/O7
15 I/O6
14 I/O5
13 I/O4

TC40H245P

OCTAL BUS TRANSCEIVERS
NONINVERTED 3-STATE OUTPUTS

Pin Configuration


VDD
(20)
DIR
(1)
(19)
ENABLE
A1 (2)
A2 (3)
A3 (4)
A4 (5)
A5 (6)
A6 (7)
A7 (8)
A8 (9)
(18) B1
(17) B2
(16) B3
(15) B4
(14) B5
(13) B6
(12) B7
(11) B8
(10)
VSS

TRUTH TABLE

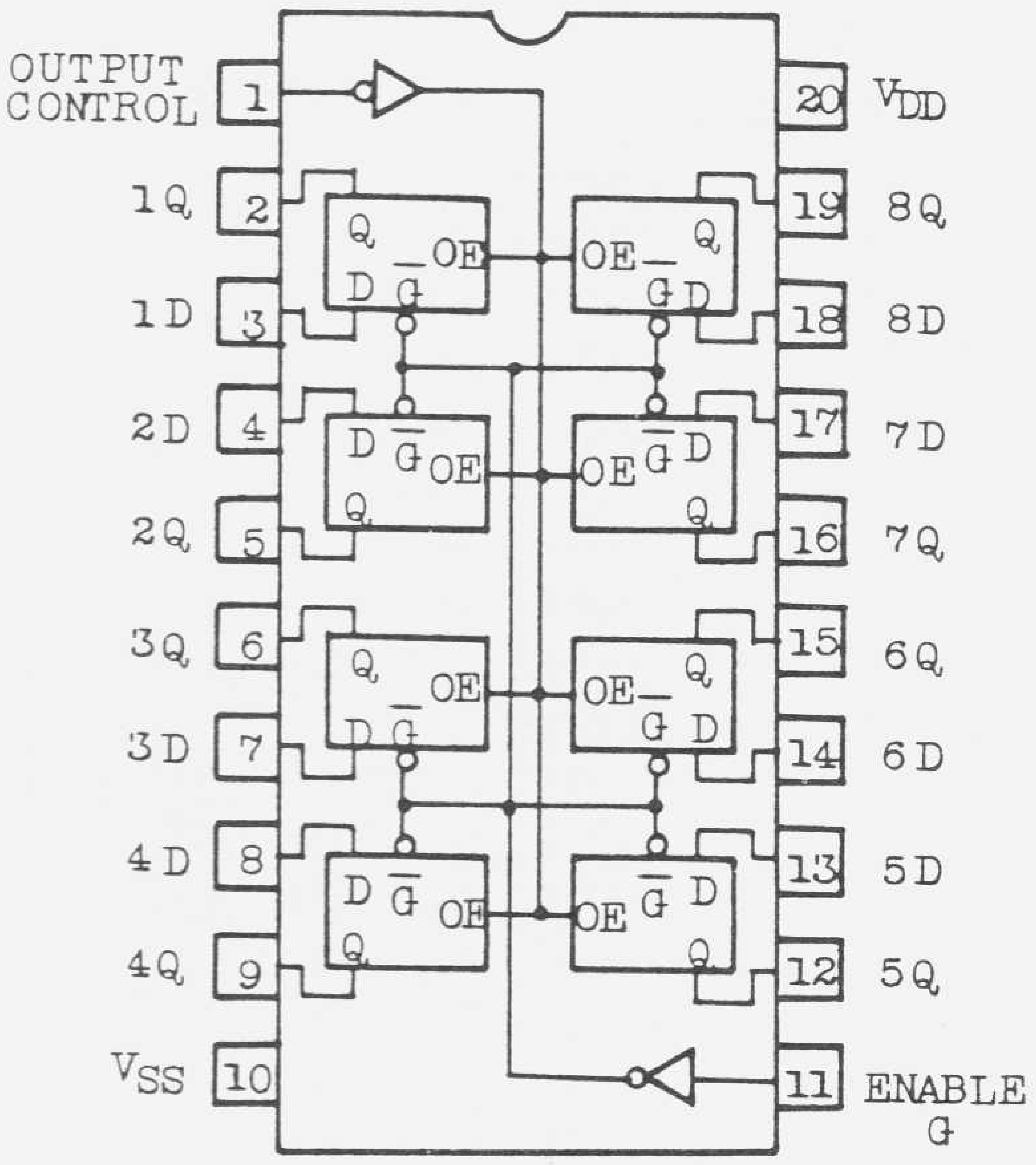
CONTROL INPUTS		DATA PORT STATUS
ENABLE	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	High Impedance

X= Don't care

TC40H373P

OCTAL "D" TYPE LATCHES

Pin Configuration


OUTPUT CONTROL 1
1Q 2
1D 3
2D 4
2Q 5
3Q 6
3D 7
4D 8
4Q 9
VSS 10
20 VDD
19 8Q
18 8D
17 7D
16 7Q
15 6Q
14 6D
13 5D
12 5Q
11 ENABLE G
Q OE D G

TRUTH TABLE

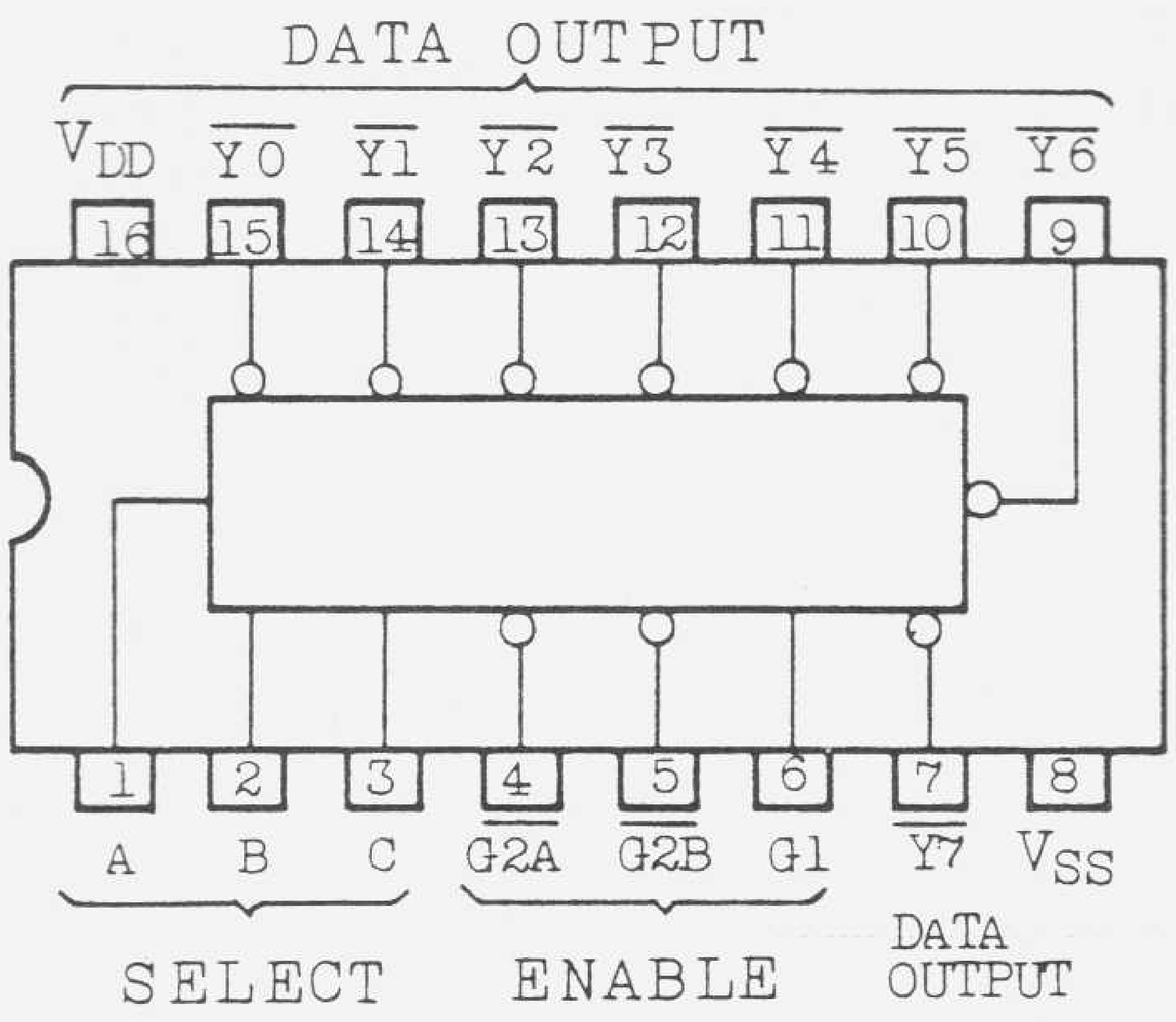
INPUTS			OUTPUT
OUTPUT CONTROL	ENABLE G	DATA	Q
L	H	H	H
L	H	L	L
L	L	*	Qo
H	*	*	High Impedance

*=Don't care

TC40H138P

3-TO-8 LINE DECODER/MULTIPLEXER

Pin Configuration


DATA OUTPUT
VDD
Y0
Y1
Y2
Y3
Y4
Y5
Y6
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
A
B
C
G2A
G2B
G1
Y7
VSS
SELECT
ENABLE
DATA OUTPUT

TRUTH TABLE

INPUTS						OUTPUTS							
ENABLE			SELECT										
G1	$\overline{G2A}$	$\overline{G2B}$	A	B	C	$\overline{Y0}$	$\overline{Y1}$	$\overline{Y2}$	$\overline{Y3}$	$\overline{Y4}$	$\overline{Y5}$	$\overline{Y6}$	$\overline{Y7}$
L	※	※	※	※	※	H	H	H	H	H	H	H	H
※	H	※	※	※	※	H	H	H	H	H	H	H	H
※	※	H	※	※	※	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	H	L	L	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	L	H	H	H	L	H	H	H	H
H	L	L	L	L	H	H	H	H	H	L	H	H	H
H	L	L	H	L	H	H	H	H	H	H	L	H	H
H	L	L	L	H	H	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L

※ : Don't care

WIRING DATA TABLE

Document scanning and editing by
Larry Hendry - www.wiseguysynth.com

CPU BOARD

Pin No.	CONNECTOR	CONTENTS	DESTINATION
1	CR3	PANEL IN 7	PANEL (R) BOARD RC3;10
2	CR3	PANEL IN 6	PANEL (R) BOARD RC3;9
3	CR3	PANEL IN 5	PANEL (R) BOARD RC3;8
4	CR3	PANEL IN 4	PANEL (R) BOARD RC3;7
5	CR3	PANEL IN 3	PANEL (R) BOARD RC3;6
6	CR3	PANEL IN 2	PANEL (R) BOARD RC3;5
7	CR3	PANEL IN 1	PANEL (R) BOARD RC3;4
8	CR3	PANEL IN 0	PANEL (R) BOARD RC3;3
9	CR3	PANEL BUTTON LED (R) 7	PANEL (R) BOARD RC3;2
10	CR3	D.GND	PANEL (R) BOARD RC3;1
11	CR1	PANEL BUTTON LED (R) 4	PANEL (R) BOARD RC1;18
12	CR1	PANEL BUTTON LED (R) 3	PANEL (R) BOARD RC1;17
13	CR1	PANEL BUTTON LED (R) 0	PANEL (R) BOARD RC1;16
14	CR1	PANEL POT (R) 4	PANEL (R) BOARD RC1;15
15	CR1	PANEL POT (R) 3	PANEL (R) BOARD RC1;14
16	CR1	PANEL POT (R) 2	PANEL (R) BOARD RC1;13
17	CR1	PANEL POT (R) 1	PANEL (R) BOARD RC1;12
18	CR1	PANEL POT (R) 0	PANEL (R) BOARD RC1;11
19	CR2	NC	
20	CR2	TO PANEL REF	PANEL (R) BOARD RC2;24
21	CR2	PANEL POT DATA IN	PANEL (R) BOARD RC2;23
22	CR2	PANEL PROTECT	PANEL (R) BOARD RC2;22
23	CR2	A.GND	PANEL (R) BOARD RC2;21
24	CR2	TO +15V	PANEL (R) BOARD RC2;20
25	CR2	TO –15V	PANEL (R) BOARD RC2;19
26	CJ	JACK HOLD	JACK BOARD JC;11
27	CJ	JACK PATCH	JACK BOARD JC;10
28	CJ	JACK ARP (SW)	JACK BOARD JC;9
29	CJ	JACK ARP CLOCK	JACK BOARD JC;8
30	CJ	CASSETTE OUT	JACK BOARD JC;7
31	CJ	CASSETTE IN	JACK BOARD JC;6
32	CJ	JACK PROTECT	JACK BOARD JC;5
33	CJ	MIDI IN	JACK BOARD JC;4
34	CJ	MIDI OUT	JACK BOARD JC;3
35	CJ	MIDI OUT	JACK BOARD JC;2
36	CJ	NC	
37	CM4	CLK OUT	MODULE BOARD MC;1
38	CM4	D.GND	MODULE BOARD MC;2
39	CM4	PANEL LFO LED	MODULE BOARD MC;3
40	CM4	PANEL LFO LED	MODULE BOARD MC;4
41	CM4	FROM MOD BUSSY	MODULE BOARD MC;5
42	CM4	RESET	MODULE BOARD MC;6
43	CM4	T1	MODULE BOARD MC;7
44	CM4	D.GND	MODULE BOARD MC;8
45	CP	+15V	POWER SUPPLY BOARD
46	CP	A.GND	POWER SUPPLY BOARD
47	CP	–15V	POWER SUPPLY BOARD
48	CP	REF (+10V)	POWER SUPPLY BOARD
49	CP	+5V (LED)	POWER SUPPLY BOARD
50	CP	D.GND	POWER SUPPLY BOARD
51	CP	+5V	POWER SUPPLY BOARD
52	CP	RESET	POWER SUPPLY BOARD
53	KC2	FROM KEYBOARD	
54	KC2	FROM KEYBOARD	
55	KC2	FROM KEYBOARD	
56	KC2	FROM KEYBOARD	
57	KC2	FROM KEYBOARD	
58	KC2	FROM KEYBOARD	
59	KC2	FROM KEYBOARD	
60	KC2	FROM KEYBOARD	
61	KC1	FROM KEYBOARD	
62	KC1	FROM KEYBOARD	
63	KC1	FROM KEYBOARD	
64	KC1	FROM KEYBOARD	
65	KC1	FROM KEYBOARD	
66	KC1	FROM KEYBOARD	
67	KC1	FROM KEYBOARD	
68	KC1	FROM KEYBOARD	
69	CL3	PANEL IN 7	PANEL (L) BOARD LC3;16
70	CL3	PANEL IN 6	PANEL (L) BOARD LC3;17
71	CL3	PANEL IN 5	PANEL (L) BOARD LC3;18
72	CL3	PANEL IN 4	PANEL (L) BOARD LC3;19
73	CL3	PANEL IN 3	PANEL (L) BOARD LC3;20
74	CL3	PANEL IN 2	PANEL (L) BOARD LC3;21
75	CL3	PANEL IN 1	PANEL (L) BOARD LC3;22
76	CL3	PANEL IN 0	PANEL (L) BOARD LC3;23
77	CL3	PANEL BUTTON LED 7	PANEL (L) BOARD LC3;24
78	CL3	D.GND	PANEL (L) BOARD LC3;25
79	CL1	PANEL BUTTON LED 6	PANEL (L) BOARD LC1;1
80	CL1	PANEL BUTTON LED 5	PANEL (L) BOARD LC1;2
81	CL1	PANEL BUTTON LED 0	PANEL (L) BOARD LC1;3
82	CL1	PANEL BUTTON LED 2	PANEL (L) BOARD LC1;4
83	CL1	PANEL BUTTON LED 1	PANEL (L) BOARD LC1;5
84	CL1	PANEL POT 3	PANEL (L) BOARD LC1;6
85	CL1	PANEL POT 2	PANEL (L) BOARD LC1;7
86	CL1	PANEL POT 1	PANEL (L) BOARD LC1;8
87	CL2	PANEL POT 0	PANEL (L) BOARD LC2;9
88	CL2	TO PANEL REF (+5V)	PANEL (L) BOARD LC2;10
89	CL2	PANEL POT DATA IN	PANEL (L) BOARD LC2;11
90	CL2	LFO LED	PANEL (L) BOARD LC2;12
91	CL2	A.GND	PANEL (L) BOARD LC2;13
92	CL2	TO +15V	PANEL (L) BOARD LC2;14
93	CL2	TO –15V	PANEL (L) BOARD LC2;15
94	CM2	CLOK OUT	MODULE BOARD 2 MC2;1
95	CM2	D.GND	MODULE BOARD 2 MC2;2
96	CM2	PANEL LFO LED	MODULE BOARD 2 MC2;3
97	CM2	PANEL LFO LED	MODULE BOARD 2 MC2;4
98	CM2	FROM MOD BUSSY	MODULE BOARD 2 MC2;5
99	CM2	RESET	MODULE BOARD 2 MC2;6
100	CM2	TO	MODULE BOARD 2 MC2;7
101	CM2	D.GND	MODULE BOARD 2 MC2;8

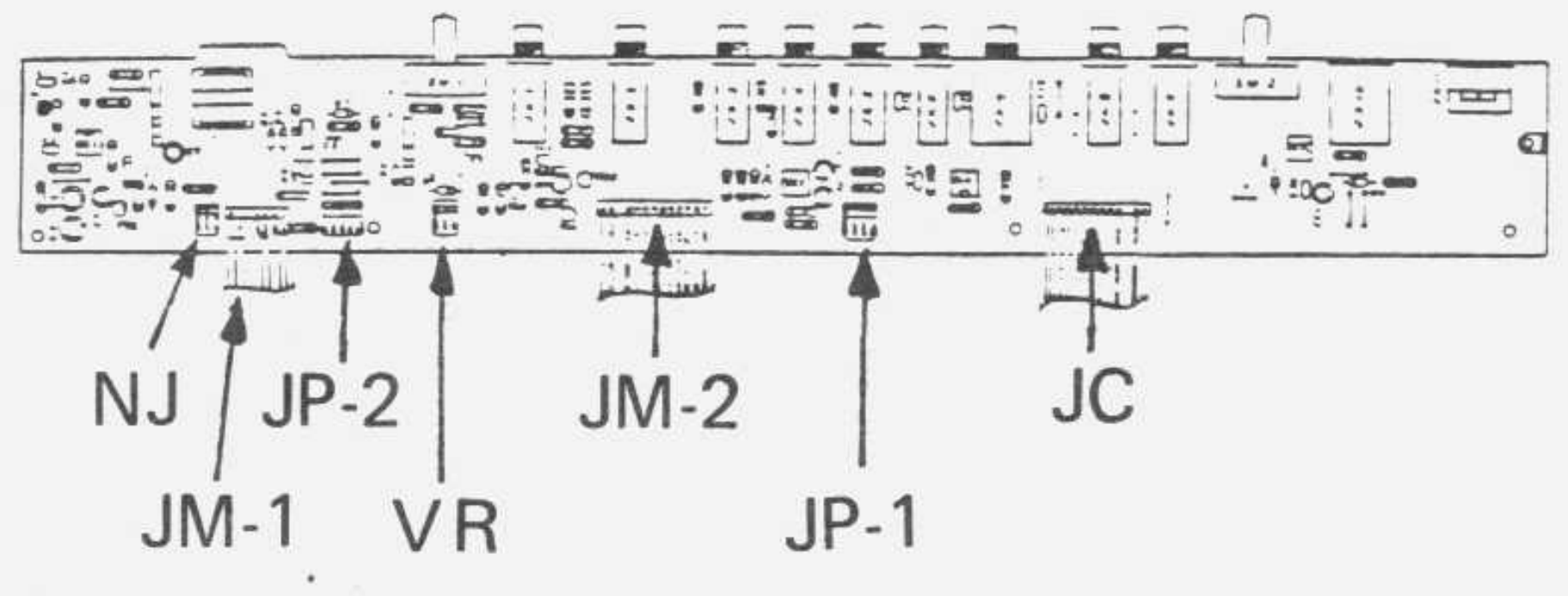
MODULE BOARD (4 VOICE)

Pin No.	CONNECTOR	CONTENTS	DESTINATION
1	MC4	CLK IN	CPU BOARD CM4;37
2	MC4	D.GND	CPU BOARD CM4;38
3	MC4	LFO IN (T0)	CPU BOARD CM4;39
4	MC4	LFO IN (T1)	CPU BOARD CM4;40
5	MC4	TX	CPU BOARD CM4;41
6	MC4	RESET	CPU BOARD CM4;42
7	MC4	RX	CPU BOARD CM4;43
8	MC4	D.GND	CPU BOARD CM4;44
9	M4P-1	+5V	POWER SUPPLY BOARD
10	M4P-1	D.GND	POWER SUPPLY BOARD
11	M4P-1	A.GND	POWER SUPPLY BOARD
12	M4P-1	–15V	POWER SUPPLY BOARD
13	M4P-1	+15V	POWER SUPPLY BOARD
14	M4P-1	Ref (+10V)	POWER SUPPLY BOARD
15	M4P-2	–15V	POWER SUPPLY BOARD
16	M4P-2	–15V	POWER SUPPLY BOARD
17	M4P-2	A.GND	POWER SUPPLY BOARD
18	M4P-2	A.GND	POWER SUPPLY BOARD
19	M4P-2	+15V	POWER SUPPLY BOARD
20	M4P-2	+15V	POWER SUPPLY BOARD
21	M4J	NOISE IN	JACK BOARD JM1;40
22	M4J	A.GND	–
23	M4J	VCA OUT	JACK BOARD JM1;36
24	M4J	VCA CONT	JACK BOARD JM2;19
25	M4J	VCF CONT	JACK BOARD JM2;17
26	M4J	VCO BEND 2	JACK BOARD JM2;21
27	M4J	VCO BEND 1	JACK BOARD JM2;23

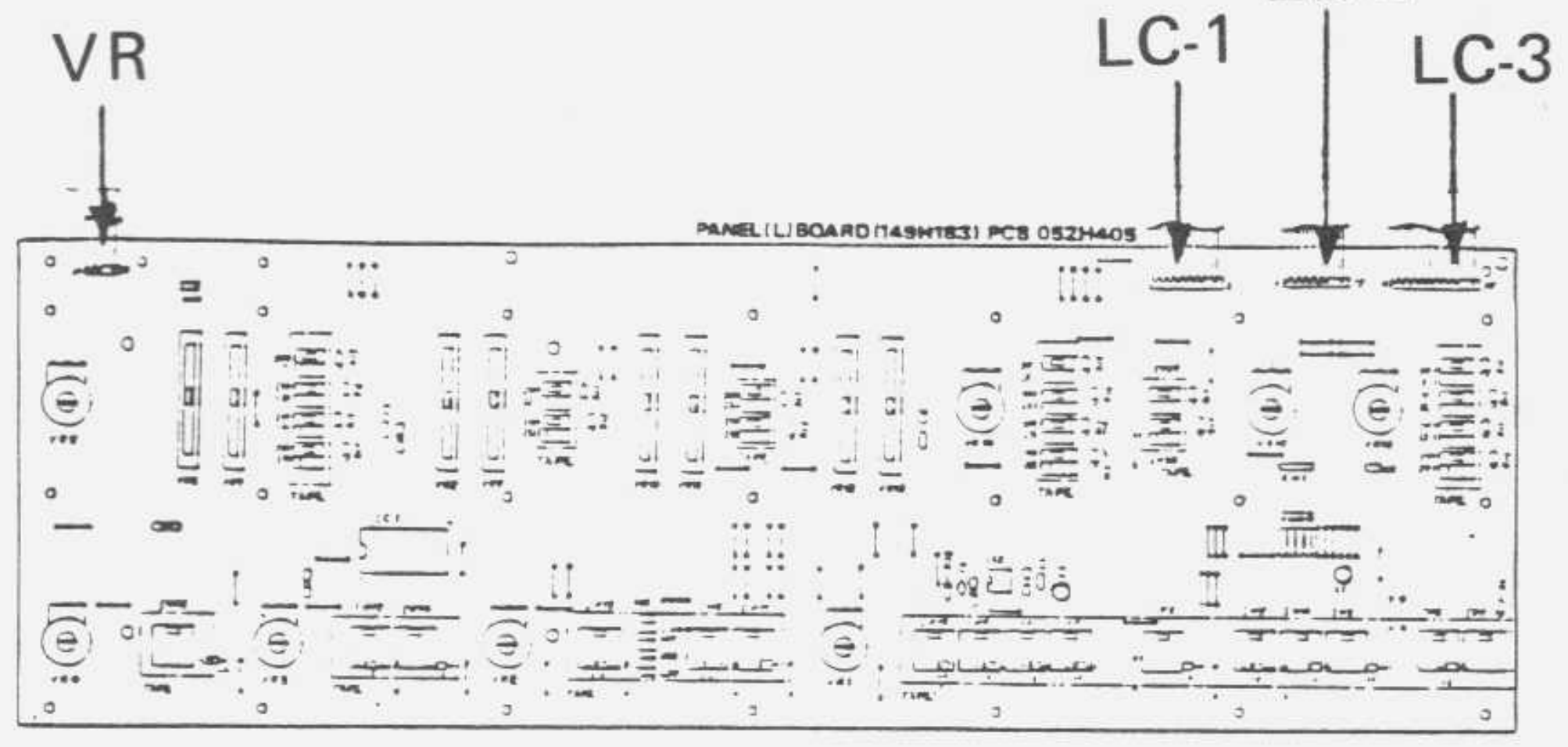
MODULE BOARD (2 VOICE)

Pin No.	CONNECTOR	CONTENTS	DESTINATION
1	MC2	CLK IN	CPU BOARD CM2;94
2	MC2	D.GND	CPU BOARD CM2;95
3	MC2	LFO IN (T0)	CPU BOARD CM2;96
4	MC2	LFO IN (T1)	CPU BOARD CM2;97
5	MC2	TX	CPU BOARD CM2;98
6	MC2	RESET	CPU BOARD CM2;99
7	MC2	RX	CPU BOARD CM2.100
8	MC2	D.GND	CPU BOARD CM2;101
9	M2P-1	+5V	POWER SUPPLY BOARD
10	M2P-1	D.GND	POWER SUPPLY BOARD
11	M2P-1	A.GND	POWER SUPPLY BOARD
12	M2P-1	–15V	POWER SUPPLY BOARD
13	M2P-1	+15V	POWER SUPPLY BOARD
14	M2P-1	Ref (+10V)	POWER SUPPLY BOARD
15	M2P-2	–15V	POWER SUPPLY BOARD
16	M2P-2	–15V	POWER SUPPLY BOARD
17	M2P-2	A.GND	POWER SUPPLY BOARD
18	M2P-2	A.GND	POWER SUPPLY BOARD
19	M2P-2	+15V	POWER SUPPLY BOARD
20	M2P-2	+15V	POWER SUPPLY BOARD
21	M2J	NOISE IN	JACK BOARD JM1;41
22	M2J	A.GND	–
23	M2J	VCA OUT	JACK BOARD JM1;38
24	M2J	VCA CONT	JACK BOARD JM2;18
25	M2J	VCF CONT	JACK BOARD JM2;16
26	M2J	VCO BEND 2	JACK BOARD JM2;20
27	M2J	VCO BEND 1	JACK BOARD JM2;22

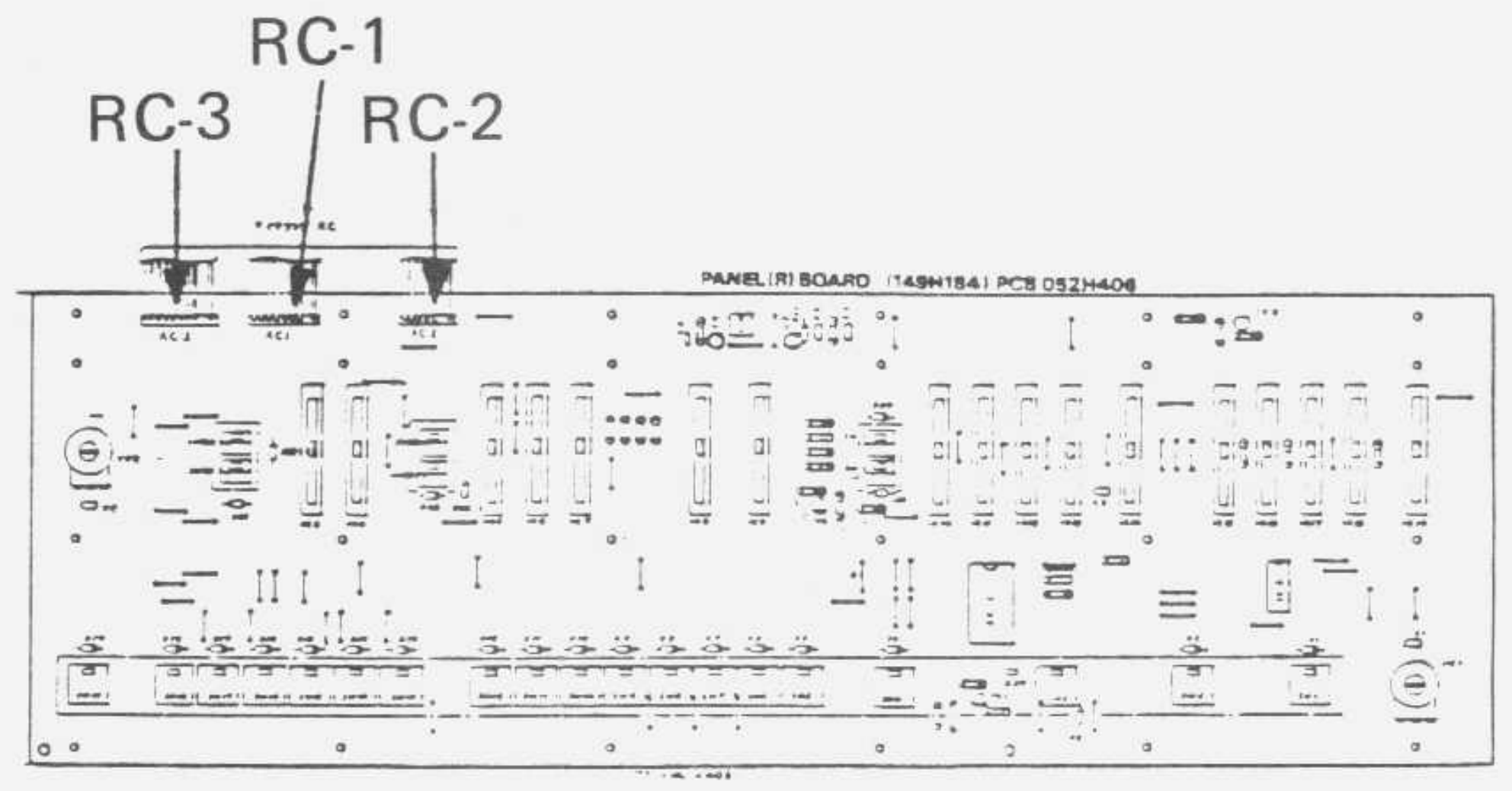
JACK BOARD PCB 052H408



PANEL BOARD (L) PCB 052H405



PANEL BOARD (R) PCB 052H406



PANEL (R) BOARD

Pin No.	CON-NECTOR	CONTENTS	DESTINATION	
1	RC3	D.GND	CPU BOARD	CR3;10
2	RC3	DECODER 7	CPU BOARD	CR3;9
3	RC3	BUS 0	CPU BOARD	CR3;8
4	RC3	BUS 1	CPU BOARD	CR3;7
5	RC3	BUS 2	CPU BOARD	CR3;6
6	RC3	BUS 3	CPU BOARD	CR3;5
7	RC3	BUS 4	CPU BOARD	CR3;4
8	RC3	BUS 5	CPU BOARD	CR3;3
9	RC3	BUS 6	CPU BOARD	CR3;2
10	RC3	BUS 7	CPU BOARD	CR3;1
11	RC1	PANEL POT 0	CPU BOARD	CR1;18
12	RC1	PANEL POT 1	CPU BOARD	CR1;17
13	RC1	PANEL POT 2	CPU BOARD	CR1;16
14	RC1	PANEL POT 3	CPU BOARD	CR1;15
15	RC1	PANEL POT 4	CPU BOARD	CR1;14
16	RC1	DECODER 0	CPU BOARD	CR1;13
17	RC1	DECODER 3	CPU BOARD	CR1;12
18	RC1	DECODER 4	CPU BOARD	CR1;11
19	RC2	–15V	CPU BOARD	CR2;25
20	RC2	+15V	CPU BOARD	CR2;24
21	RC2	A.GND	CPU BOARD	CR2;23
22	RC2	PANEL PROTECT	CPU BOARD	CR2;22
23	RC2	POT DATA	CPU BOARD	CR2;21
24	RC2	+5V (REF)	CPU BOARD	CR2;20

PANEL (L) BOARD

Pin No.	CON-NECTOR	CONTENTS	DESTINATION	
1	LC1	DECODER 6	CPU BOARD	CL1;79
2	LC1	DECODER 5	CPU BOARD	CL1;80
3	LC1	DECODER 0	CPU BOARD	CL1;81
4	LC1	DECODER 2	CPU BOARD	CL1;82
5	LC1	DECODER 1	CPU BOARD	CL1;83
6	LC1	PANEL POT OUT 3	CPU BOARD	CL1;84
7	LC1	PANEL POT OUT 2	CPU BOARD	CL1;85
8	LC1	PANEL POT OUT 1	CPU BOARD	CL1;86
9	LC2	PANEL POT OUT 0	CPU BOARD	CL2;87
10	LC2	REF (+5V)	CPU BOARD	CL2;88
11	LC2	VR DATA	CPU BOARD	CL2;89
12	LC2	LFO LED	CPU BOARD	CL2;90
13	LC2	A.GND	CPU BOARD	CL2;91
14	LC2	+15V	CPU BOARD	CL2;92
15	LC2	–15V	CPU BOARD	CL2;93
16	LC3	BUS 7	CPU BOARD	CL3;69
17	LC3	BUS 6	CPU BOARD	CL3;70
18	LC3	BUS 5	CPU BOARD	CL3;71
19	LC3	BUS 4	CPU BOARD	CL3;72
20	LC3	BUS 3	CPU BOARD	CL3;73
21	LC3	BUS 2	CPU BOARD	CL3;74
22	LC3	BUS 1	CPU BOARD	CL3;75
23	LC3	BUS 0	CPU BOARD	CL3;76
24	LC3	DECODER 7	CPU BOARD	CL3;77
25	LC3	D.GND	CPU BOARD	CL3;78
26	VR	POT IN	JACK BOARD	VR;28
27	VR	POT OUT	JACK BOARD	VR;30
28	VR	A.GND	JACK BOARD	VR;29

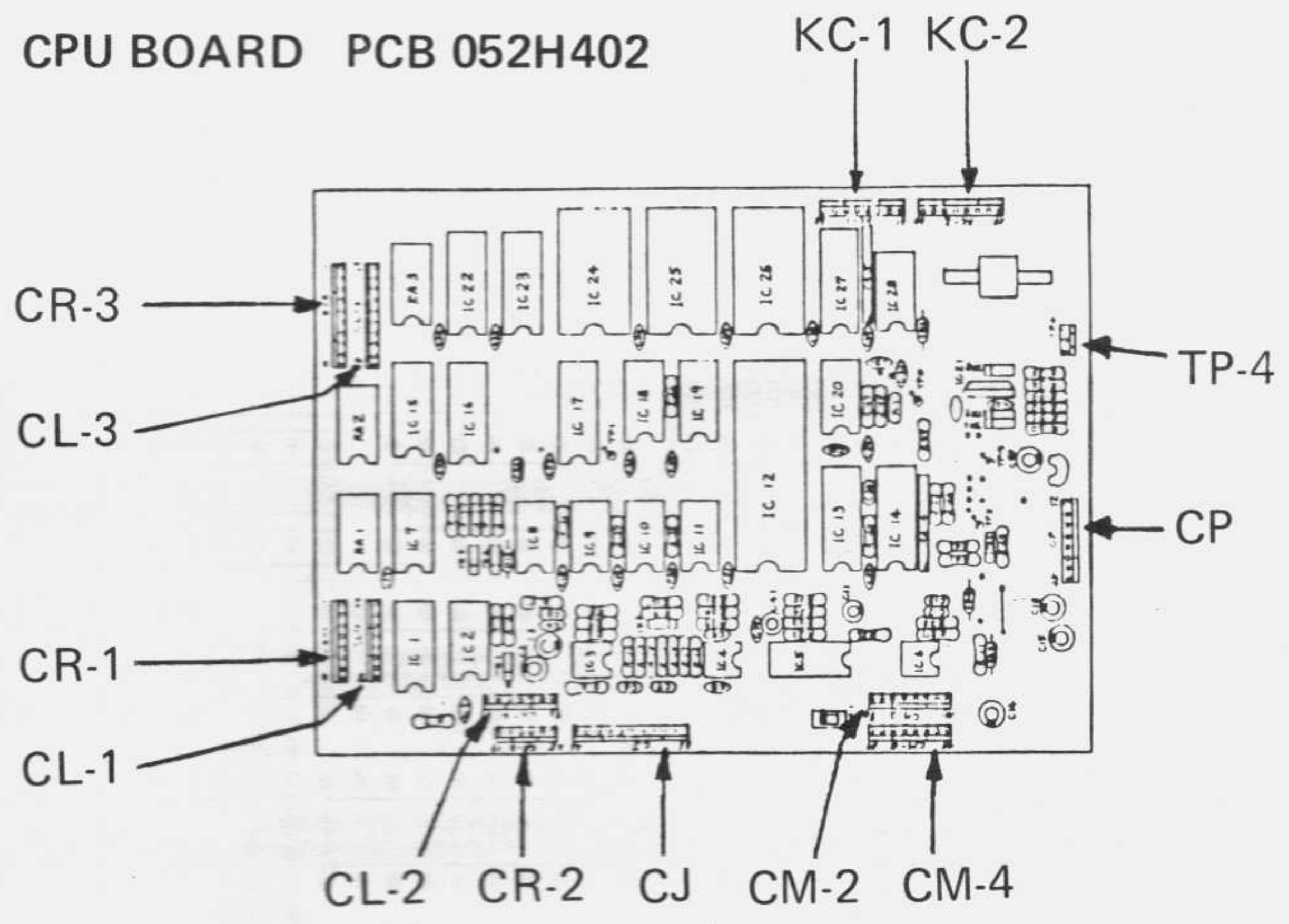
JACK BOARD

Pin No.	CONNECTOR	CONTENTS	DESTINATION	
1	JC	NC	–	
2	JC	MIDI OUT	CPU BOARD	CJ;35
3	JC	MIDI OUT	CPU BOARD	CJ;34
4	JC	MIDI IN	CPU BOARD	CJ;33
5	JC	MEMORY PROTECT	CPU BOARD	CJ;32
6	JC	CASSETTE IN	CPU BOARD	CJ;31
7	JC	CASSETTE OUT	CPU BOARD	CJ;30
8	JC	ARP.CLK	CPU BOARD	CJ;29
9	JC	ARP.CLK (SW)	CPU BOARD	CJ;28
10	JC	PATCH SHIFT	CPU BOARD	CJ;27
11	JC	PEDAL HOLD	CPU BOARD	CJ;26
12	JP1	+15V	POWER SUPPLY BOARD	
13	JP1	A.GND	POWER SUPPLY BOARD	
14	JP1	A.GND	POWER SUPPLY BOARD	
15	JP1	–15V	POWER SUPPLY BOARD	
16	JM2	VCF CONT (MODU 2)	MODULE BOARD 2	M2J;25
17	JM2	VCF CONT (MODU 4)	MODULE BOARD 4	M4J;25
18	JM2	VCA CONT (MODU 2)	MODULE BOARD 2	M2J;24
19	JM2	VCA CONT (MODU 4)	MODULE BOARD 4	M4J;24
20	JM2	BENDER VCO-2 (TO MODU 2)	MODULE BOARD 2	M2J;26
21	JM2	BENDER VCO-2 (TO MODU 4)	MODULE BOARD 4	M4J;26
22	JM2	BENDER VCO-1 (TO MODU 2)	MODULE BOARD 2	M2J;27
23	JM2	BENDER VCO-1 (TO MODU 4)	MODULE BOARD 4	M4J;27
24	JM2	FROM VCO-1 BENDER	BENDER BOARD	BJ;4
25	JM2	FROM VCO-2 BENDER	BENDER BOARD	BJ;5
26	JM2	FROM VCF BENDER	BENDER BOARD	BJ;6
27	JM2	NC		
28	VR	POT IN	PANEL BOARD (L)	VR;26
29	VR	A.GND	PANEL BOARD (L)	VR;28
30	VR	POT OUT	PANEL BOARD (L)	VR;27
31	JP2	RESET	POWER SUPPLY BOARD	
32	JP2	+15V	POWER SUPPLY BOARD	
33	JP2	A.GND	POWER SUPPLY BOARD	
34	JP2	A.GND	POWER SUPPLY BOARD	
35	JP2	–15V	POWER SUPPLY BOARD	
36	JM1	VCA OUT (MODU 4)	MODULE BOARD 4	M4J;23
37	JM1	A.GND	MODULE BOARD 4	M4J;22
38	JM1	VCA OUT (MODU 2)	MODULE BOARD 2	M2J;23
39	JM1	A.GND	MODULE BOARD 2	M4J;22
40	JM1	NOISE OUT (MODU 4)	MODULE BOARD 4	M4J;21
41	JM1	NOISE OUT (MODU 2)	MODULE BOARD 2	M2J;21
42	NJ	TO XLR (1)		
43	NJ	TO XLR (2)		
44	NJ	TO XLR (3)		

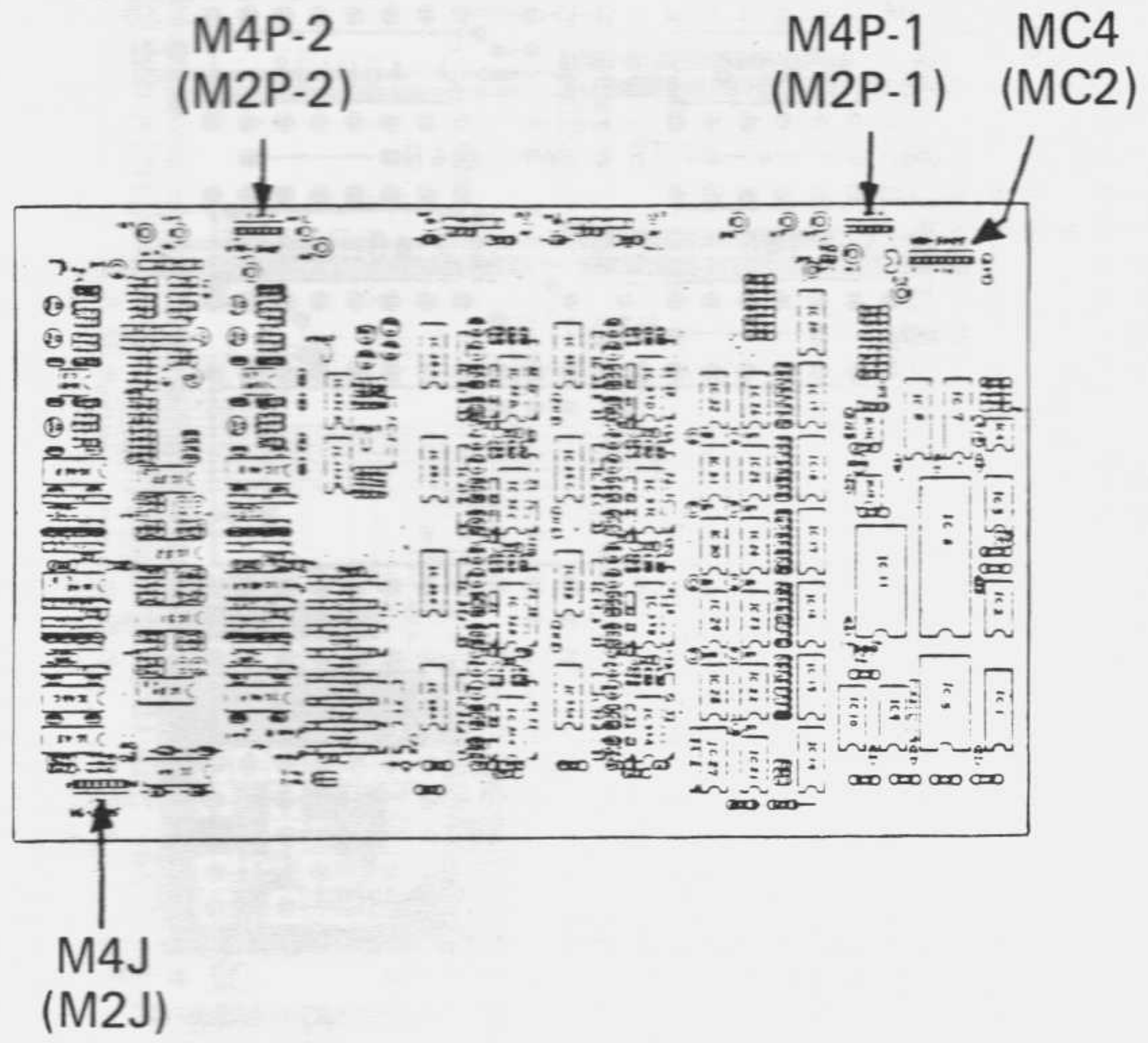
BENDER BOARD

Pin No.	CONNECTOR	CONTENTS	DESTINATION	
1	BP	A.GND	POWER SUPPLY BOARD	
2	BP	+15V	POWER SUPPLY BOARD	
3	BP	–15V	POWER SUPPLY BOARD	
4	BJ	VCO-1 CONT	JACK BOARD	JM2;24
5	BJ	VCO-2 CONT	JACK BOARD	JM2;25
6	BJ	VCF CONT	JACK BOARD	JM2;26
7	BJ	NC		
8	BE	A.GND	PB-6	
9	BE	–15V	PB-6	
10	BE	CONT	PB-6	
11	BE	+15V	PB-6	

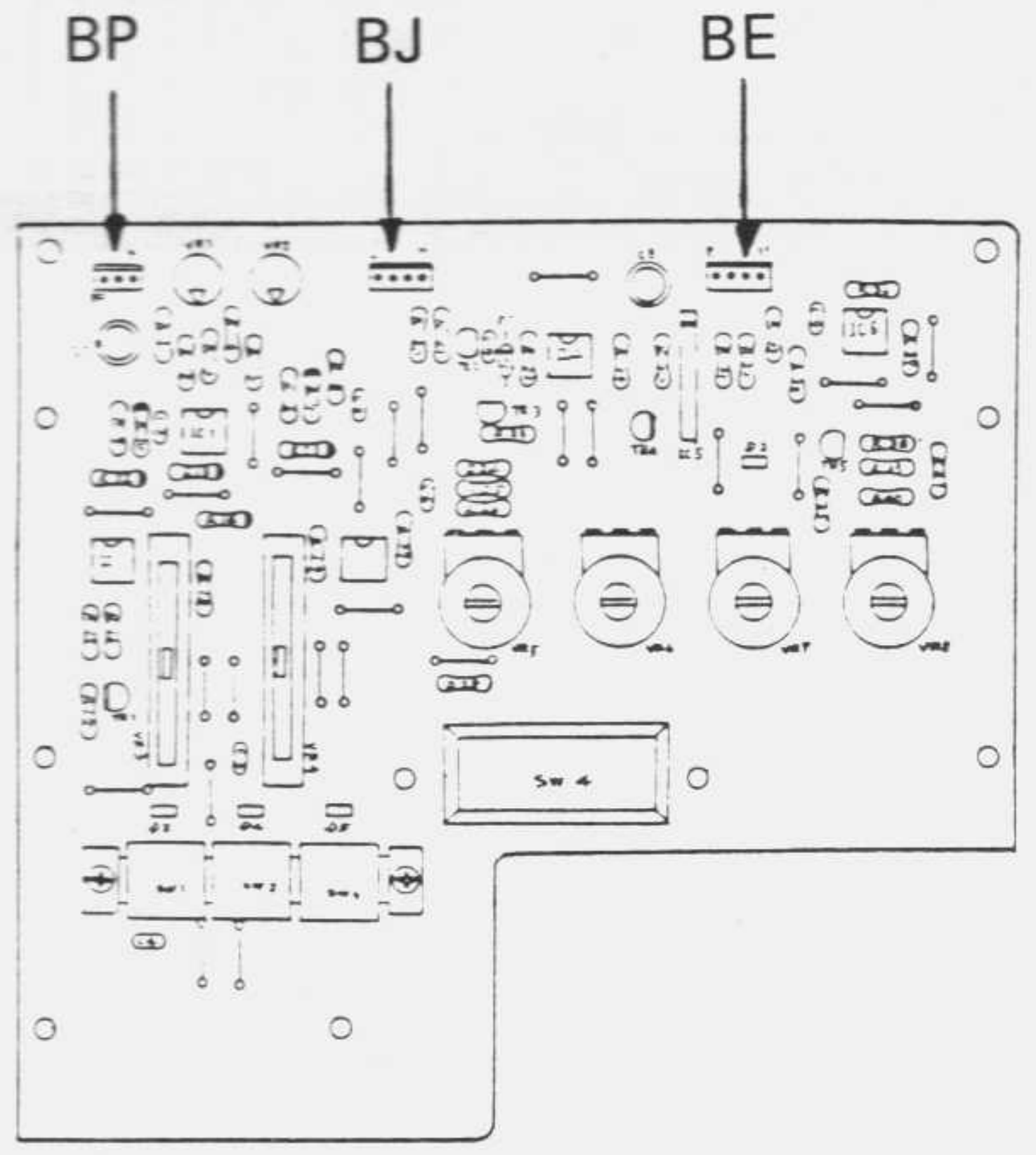
CPU BOARD PCB 052H402



MODULE BOARD 4 Voice (2 Voice) PCB 052H403

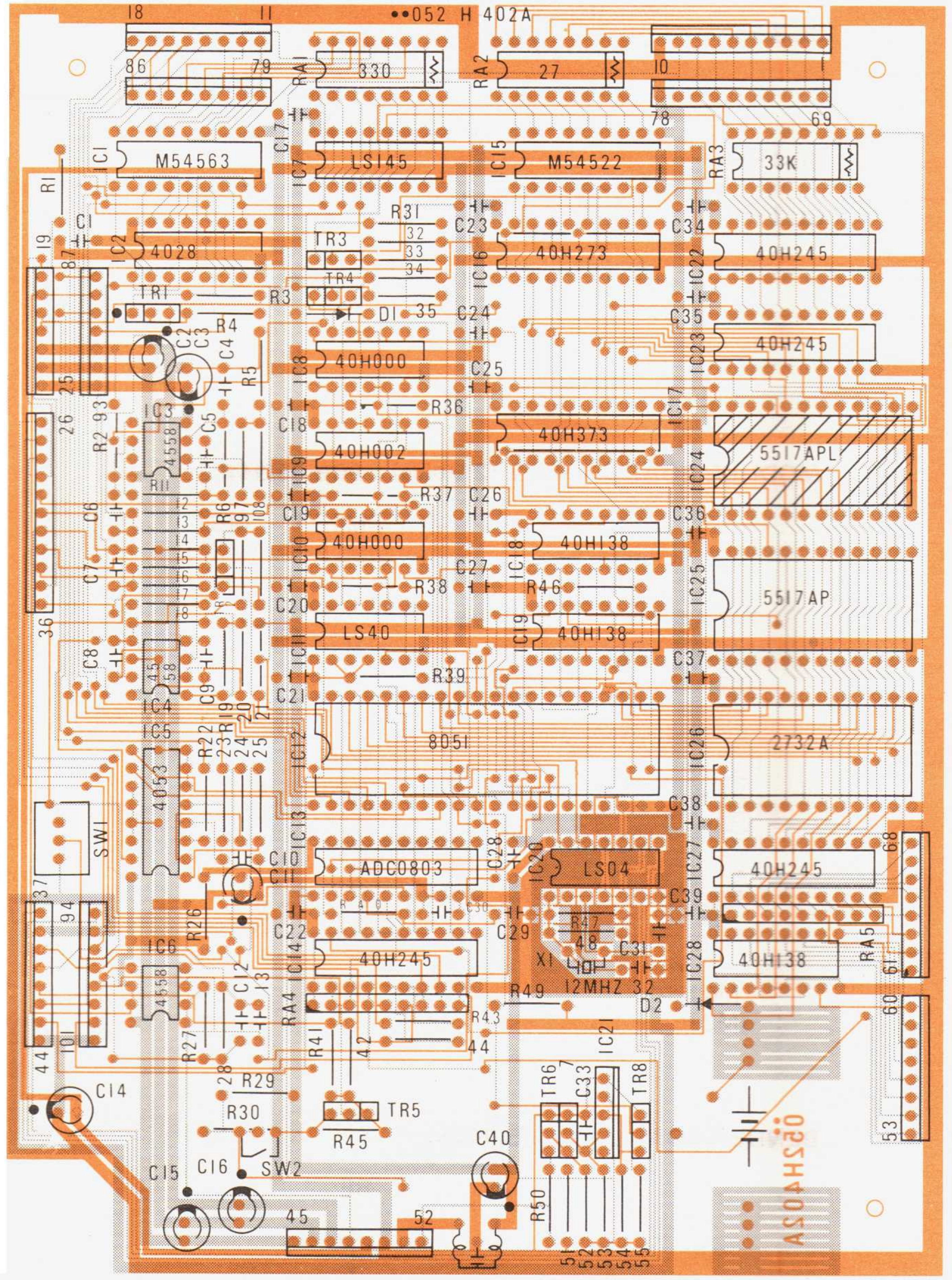


BENDER BOARD PCB 052H404



CPU BOARD

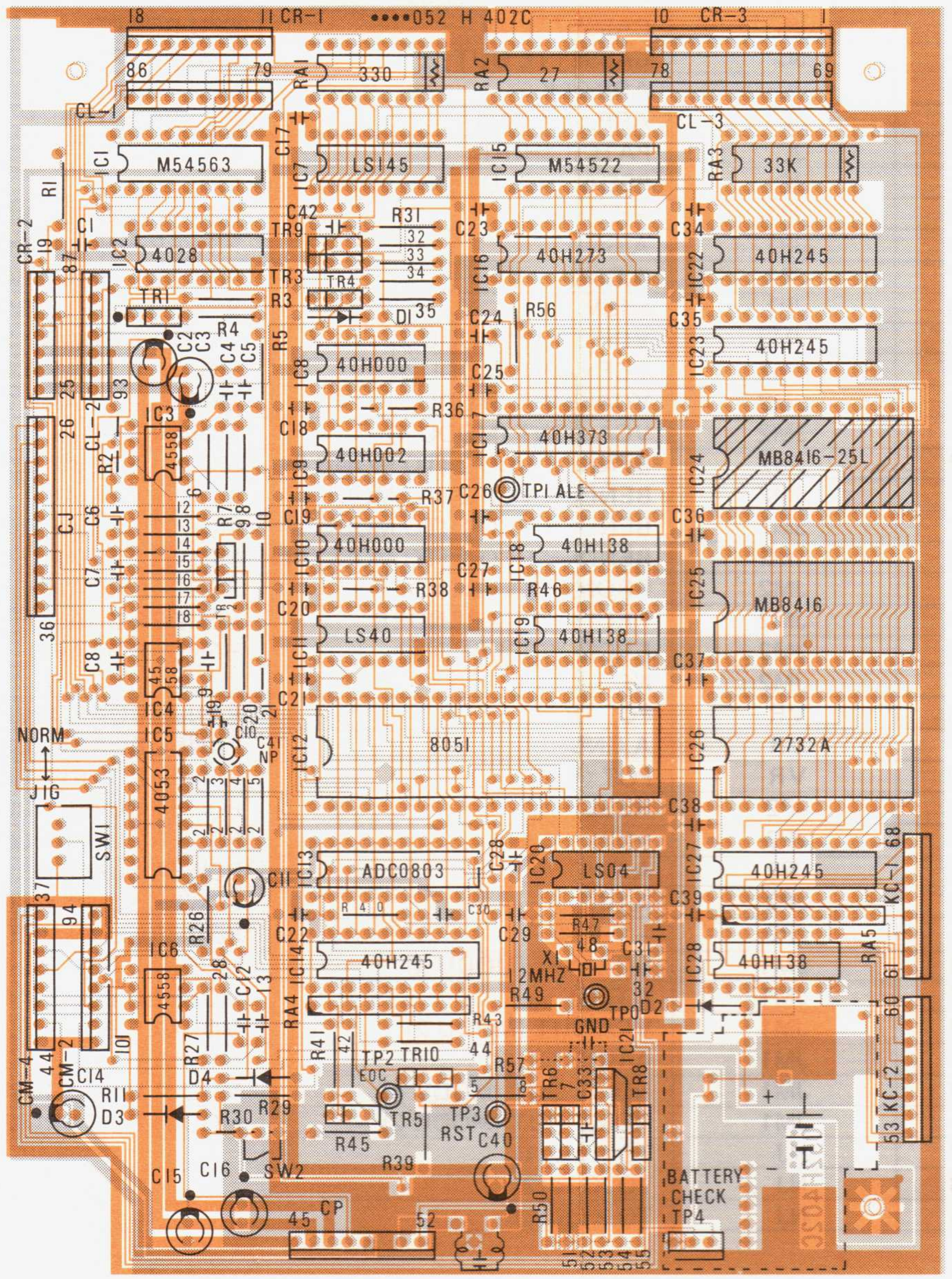
149H179 (PCB 052H402A)



052 H 402A
M54563
LS145
M54522
4028
40H273
40H245
40H000
40H002
40H373
5517APL
40H138
5517AP
LS40
8051
2732A
ADC0803
LS04
40H245
40H138
4053
4558
12MHZ
SW1
SW2
330
27
33K

(PCB 052H402C) SERIAL NUMBER 311800 AND UP

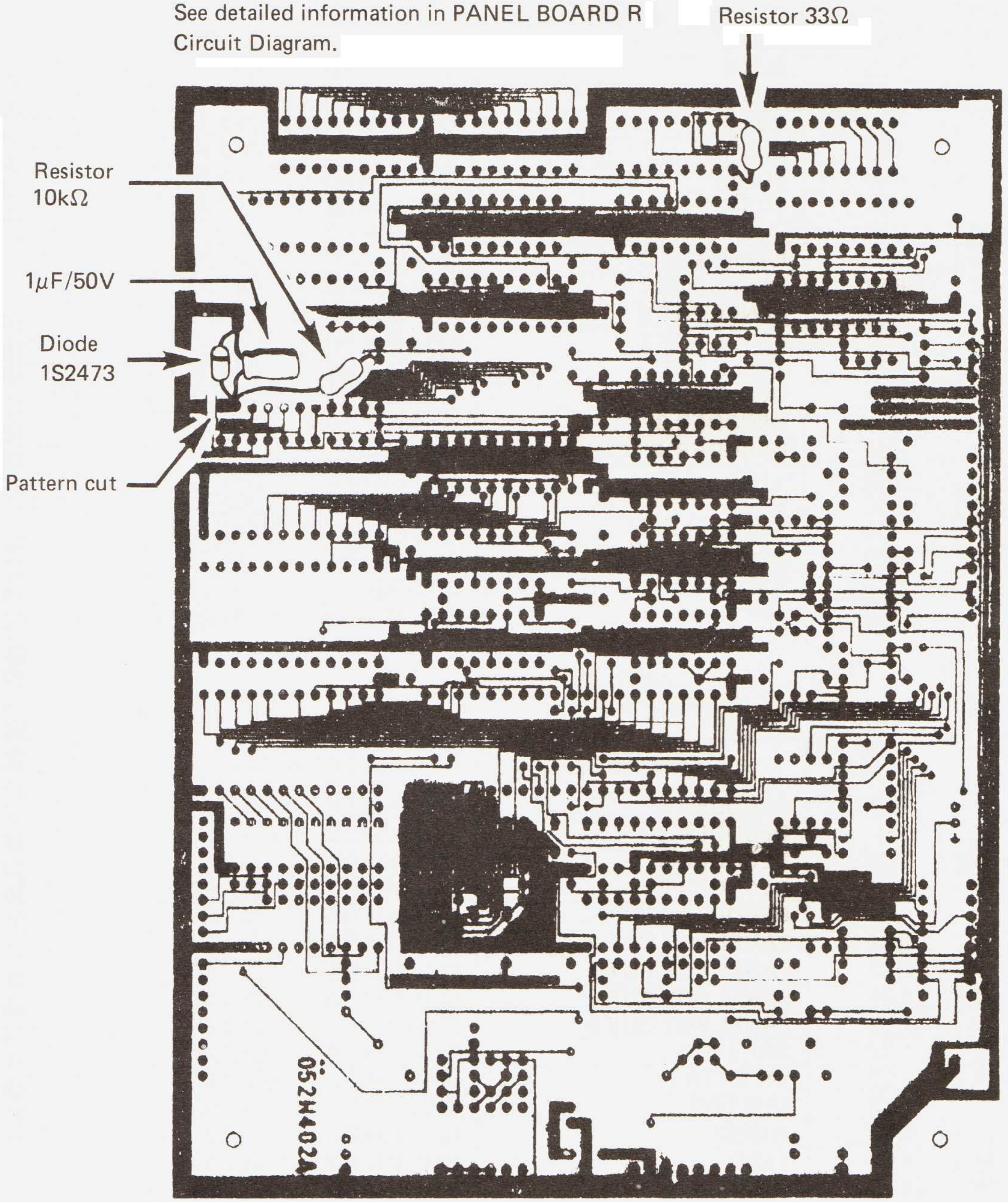
052H402B SERIAL NUMBER 280650-311799
Simillar to 052H402C except
some components are surface mounted.



052 H 402C
CR-1
CR-3
CL-1
CL-3
M54563
LS145
M54522
4028
40H273
40H245
40H000
40H002
40H373
MB8416-25L
TP1 ALE
40H138
MB8416
LS40
8051
2732A
ADC0803
LS04
40H245
40H138
4053
4558
NORM
JIG
12MHZ
GND
TP0
TP2
TRIO
TP3
RST
BATTERY CHECK
TP4
KC-1
KC-2
SW1
SW2
330
27
33K

MODIFICATION

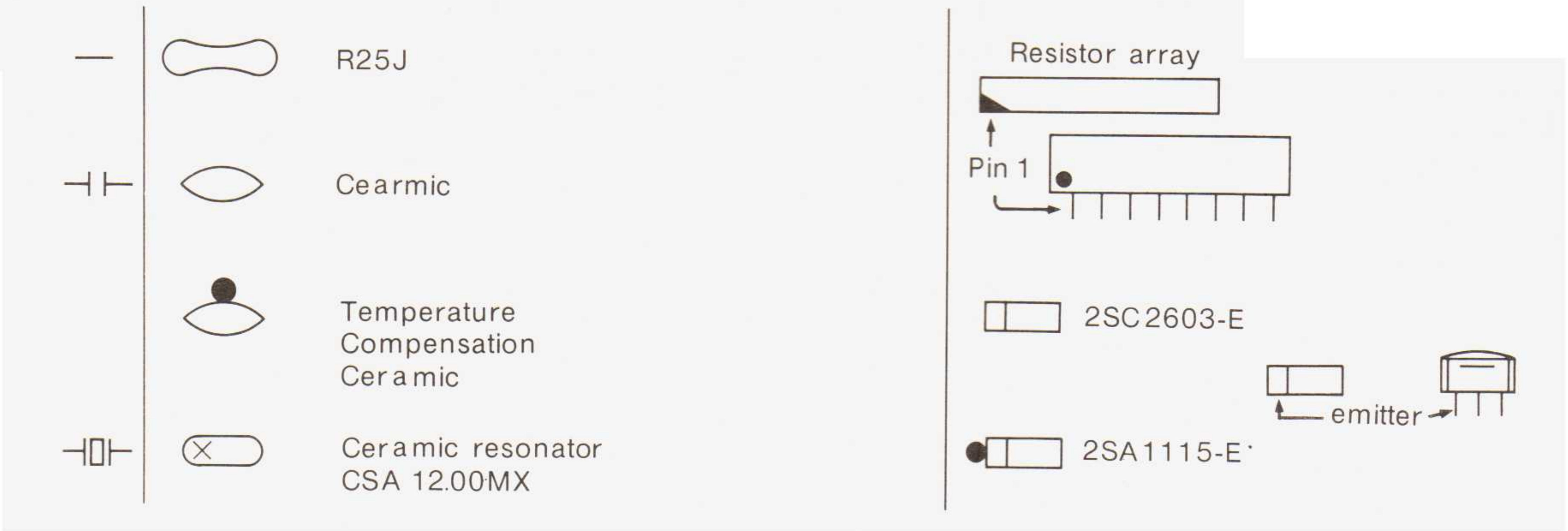
For positive switch scanning in TAPE modes.
See detailed information in PANEL BOARD R
Circuit Diagram.



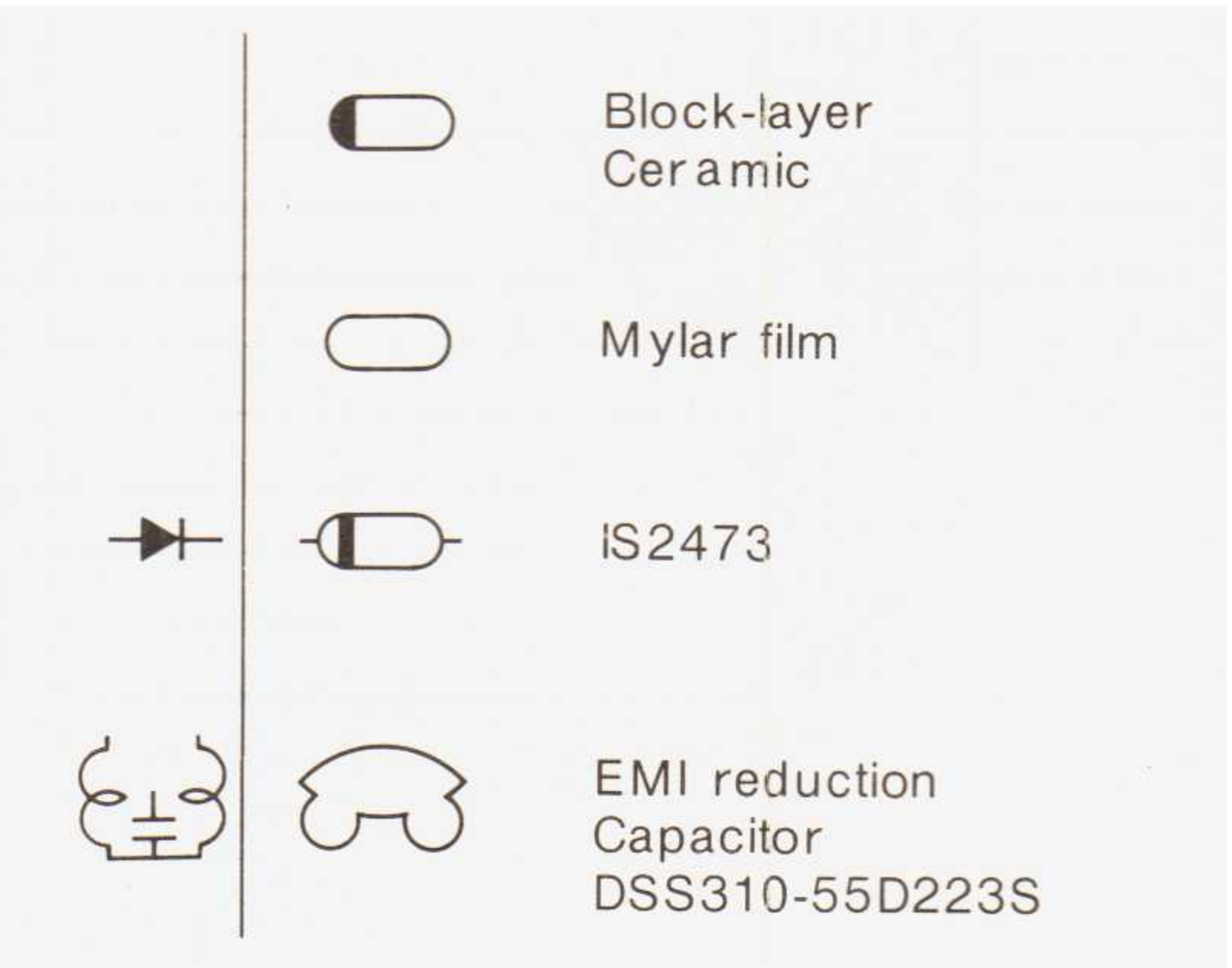
Resistor 33Ω
Resistor 10kΩ
1μF/50V
Diode 1S2473
Pattern cut
052H402A

View from foil side

This modification is unnecessary
when TR3, R24, R25 and R26 are
present on PANEL BOARD R.



R25J
Cearmic
Temperature Compensation Ceramic
Ceramic resonator CSA 12.00MX
Resistor array
Pin 1
2SC2603-E
2SA1115-E
emitter



Block-layer Ceramic
Mylar film
IS2473
EMI reduction Capacitor DSS310-55D223S

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CIRCUIT DIAGRAM
CPU BOARD

C P U BOARD
149H179 (PCB 052H402)
ADDRESS
CASSETTE INTERFACE
MEMORY PROTECT
ADDRESS DECODERS
BACKUP
WRITE
READ
DC SUPPLY
A/D POT
ADDRESS LATCH
PROM
RAM TONE
RAM WORKING
DECODERS
MIDI OUT
SERIAL DATA TRANS-MISSION
ADDRESS/DATA
A/D
MASTER CLOCK
PULLED UP SW SCAN
SW DATA
KEYBOARD DATA
JACK DATA
PANEL POT DATA
KEYBOARD ADDRESS
LED DRIVE
SW ADDRESS
PANEL BOARD MATRIXES
IC12 8031 or 8051
IC17 373
IC26 2732A
IC24 5517APL
IC25 5517APL
IC13 ADC0803
IC20 LS04
IC21 M51201L
IC6 IR9022
IC3 IR9022
IC4 082
IC11 LS40
IC10 000
IC8 000
IC9 002
IC18 138
IC19 138
IC28 138
IC2 4028
IC7 LS145
IC1 M54563
IC5 4053
IC15 M54522
IC16 273
IC22 245
IC23 245
IC27 245
IC14 245
X1 XTAL 12 MHZ
CASSETTE IN
CASSETTE OUT
MIDI OUT
MIDI IN
TP-0
TP-1
TP-2
TP-3
TP-4
SW1 JIG
4053
4028
40H138
74LS145
74LS04
74LS40
40H002
40H000
IR9022
082
40H245
40H273
40H373

The later PCBs having CPU P8051-318 for IC12 do not require IC26. To enable the internal PROM, EA(pin31)of P8051 is pulled up through 10k ohms.

NOTE: P8051 without 318 must be treated as P8031

IC24 : TC5517APL or MB8416-25LP
IC25 : 5517-APL or -AP: 8416-25LP or -25P

RA1 :EXQ-D08E330J
RA3 :EXQ-D08E33KJ
RA2 :EXQ-D08E27J
RA4 :RM8-103K

TR1 :2SA937 Q or R
TR2 - TR8 :2SC2021 Q or R

D1,D2 :1S2473

IC1 :M54563P
IC3, IC6 :IR9022
IC8, IC10 :TC40H000
IC11 :74LS40
IC13 :ADC0803
IC15 :M54522
IC17 :TC40H373
IC20 :74LS04
IC24,25 :TC5517APL

IC2 :TC4028BP
IC7 :74LS145
IC9 :TC40H002
IC12 :P8031
IC14,22,23,27 :TC40H245
IC16 :TC40H273
IC18,19,28 :TC40H138
IC21 :M51201L
IC26 :2732A-A

Highest ref des :IC28,TR8,D2,C41,R55,RA5,SW1

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CIRCUIT DIAGRAM
MODULE BOARD
SN up to 270649

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MODULE BOARD (4 VOICE)
149H180 (PCB 052H403)

MODULE BOARD (2 VOICE)
149H181 (PCB 052H403)

COMPU-TUNE
Comparator
Analog SW
LATCH
S/H
VCO
MIXER
VCF
1st VCA
2nd VCA
DC SUPPLY VCO
DC SUPPLY VCA
ANALOG SW
ADDRESS PROM
LATCH
LEVEL SHIFTER
ADDRESS DECODER
IC44 MC14551
IC4 HA17903PS
4051 IC20
IC2 000
IC7 273
IC8 273
IC11 ITS80141
IC12 TL081
TP1
TP2A
TP2B
TP2C
TP2D
TP3
TP4
IC 6 8031
IC1 373
2732A IC5
IR9022 IC13
MC14504B IC10
LS145 IC9
IC3 LS04
IC21 TL064
IC39 M5218L
M5218L IC40
M5230L IC55
TR1
TR2
TR3
IC33A 3340
IC34A EHM-S226W83S
IC36A 3340
IC37A EHM-S226W83S
VCO A1
VCO A2
VCO B1
VCO B2
VCO C1
VCO C2
VCO D1
VCO D2
RM0889 RA3A
RM0889 RA5A
RM0689 RA4A
RM0689 RA7A
MC14551 IC27
MC14551 IC45
3360 IC43AB
4053 IC35A
4053 IC38A
BA662 IC41A
BA662 IC42A
VCF
See attached VCF circuit diagram
CUT OFF
RESONANSE
IR9022 IC48AB
MC14551 IC50
IC49A 3360
IC53 μPC1252H2
M5218L IC54
OUT PUT OFF SET
OUT PUT LEVEL
IC19 4051
IC18 4051
IC17 4051
IC16 4051
IC15 4051
IC14 4051
IC26,32 TL064
IC25,31 TL064
IC23,29 TL064
IC24,30 TL064
IC22,28 TL064
IC21 TL064
VCA CONT M4J;24
NOISE IN M4J;21
VCF CONT M4J;25
VCO BEND 1 M4J;27
VCO BEND 2 M4J;26
A.GND M4J;22
(10V) REF M4P-1;14
+15V M4P-1;13
-15V M4P-1;12
A.GND M4P-1;11
D.GND M4P-1;10
+5V M4P-1;9
RESET MC4;6
TX MC4;5
RX MC4;7
LFO IN(T0) MC4;3
LFO IN(T1) MC4;4
D.GND MC4;2
D.GND MC4;8
CLK IN MC4;1
VCA OUT M4J;23
+15V M4P-2;20
-15V M4P-2;19
A.GND M4P-2;18
A.GND M4P-2;17
-15V M4P-2;16
-15V M4P-2;15
MC14551
MC14551 (PWM)
MC14504B
CEM3340
HA17903PS
TC4053BP
IR9022
IR3109
LS145
TL064
BA662
40H373
40H273
M5218L
TC4051
TL081
40H000
LS04

IC1	:TC40H373P	IC2	:TC40H000P
IC3	:74LS04	IC4	:HA17903PS
IC5	:2732A	IC6	:P8031
IC7,8	:TC40H273P	IC9	:74LS145
IC10	:MC14504B	IC11	:ITS80141
IC12	:TL081	IC13,48AB,48CD	:IR9022
IC14-20	:HD14051BP	IC21-26,28-32	:TL064
IC27,44,45,50	:MC14551B	IC33A,33B,33C, IC33D,36A,36B, IC36C,36D	:CEM3340
IC34A,34B,34C, IC34D,37A,37B IC37C,37D	:EHM-S226W83S	IC39,40,54	:M5218L
IC35A,35B,35C, IC35D,38A,38B, IC38C,38D	:TC4053BP	IC41A,41B,41C, IC41D,42A,42B IC42C,42D	:BA662
IC43A,43B,43C, IC43D,49A,49B IC49C,49D	:CEM3360	IC53 IC55	:uPC :M5230L
RA2	:DAP-601	RA3A,3B,3C,3D, RA5A,5B,5C,5D	:RM0889
RA4A,4B,4C,4D, RA7A,7B,7C,7D	:RM0689		
TR1,2,3	:2SA937Q or R	D1 - 9	:1S2473

Highest ref des :IC55,TR3,D11,C115,R88,RA14,VR11

VCF CIRCUIT (detail)

A
B
C
D
41A
42A
R57A
2.2k
RA12A
1/2
IC57A 1/2
M5218L
IC56A 1/4
IR3109
IC57AB 1/4
IR3109
5P
RA13A
1/2
(NC)
33P
RA11A
1/4
C102A
P 330P
C104A
P 330P
33K
R58A
RA14AB
1/4
R65A
56k
56k
R66A
IC61
IC61 1/4
MC14551B
IC57A
M5218L
D11A
D10A
RA12A
1/2
C105A
P330P
C103A
P 330P
R67A
10k
10k
R68A
IC50
57A
56A
56
57AB
57B
56B
61
57C
56C
57C.D
57D
56D

The diagrams on the facing and this pages are not keyed to designations on PCB 052H403 but are to the layout below.

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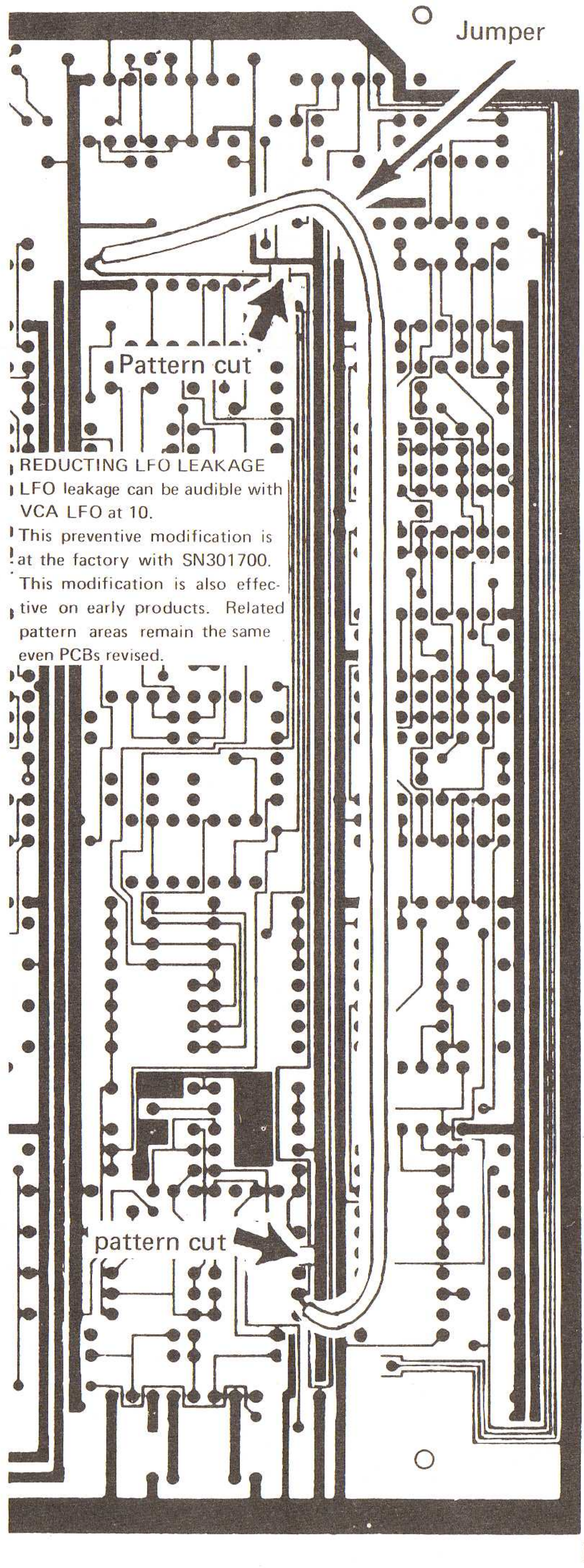
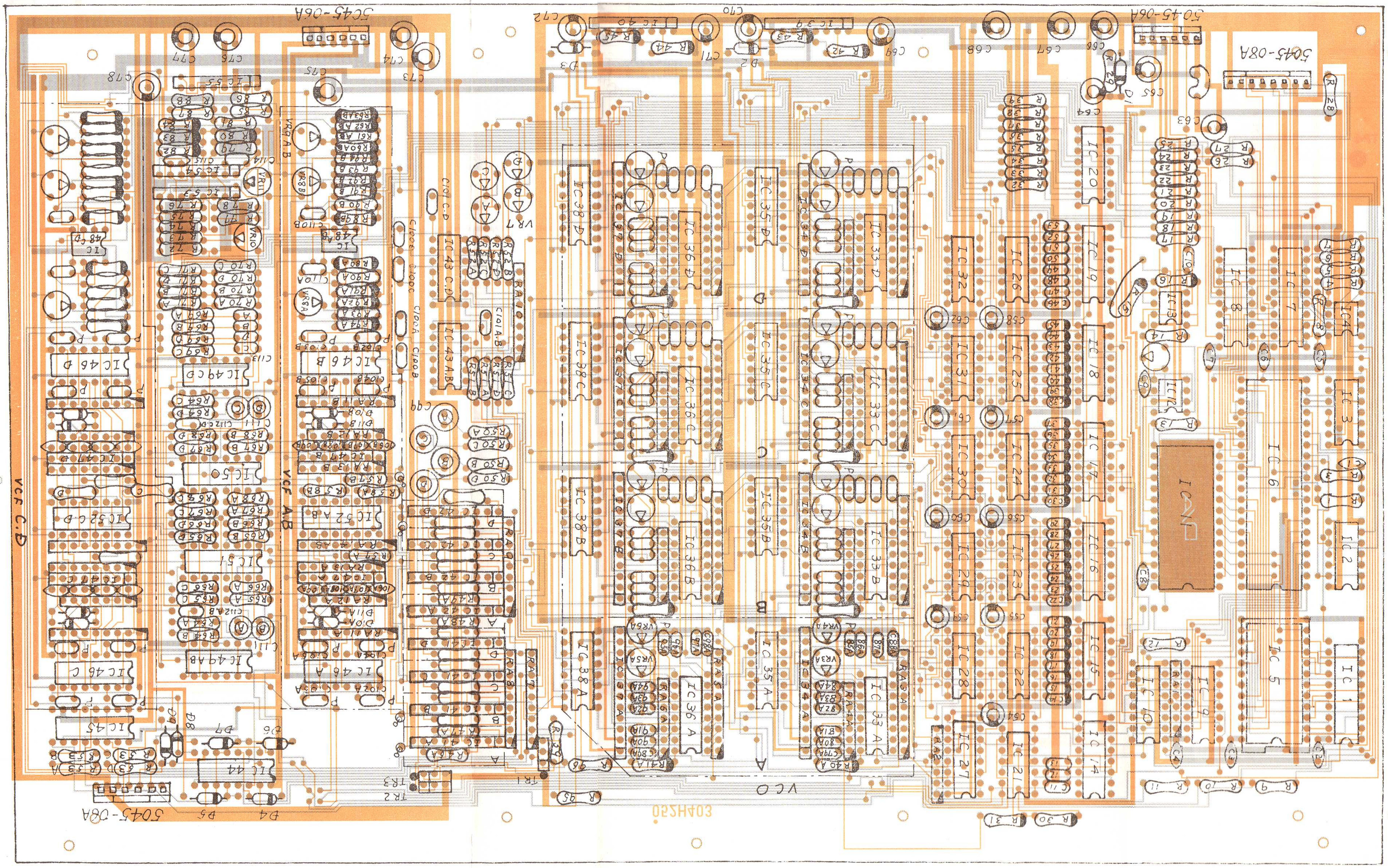

Jumper
Pattern cut
pattern cut

REDUCTING LFO LEAKAGE

LFO leakage can be audible with VCA LFO at 10.

This preventive modification is at the factory with SN301700. This modification is also effective on early products. Related pattern areas remain the same even PCBs revised.


VCF C.D
VCF A.B
VCO
052H403
5045-06A
5045-08A

SERIAL NUMBER UP TO 270649

MODULE BOARD

4-VOICE (149H180)

2-VOICE (149H181)

(pcb 052H403)

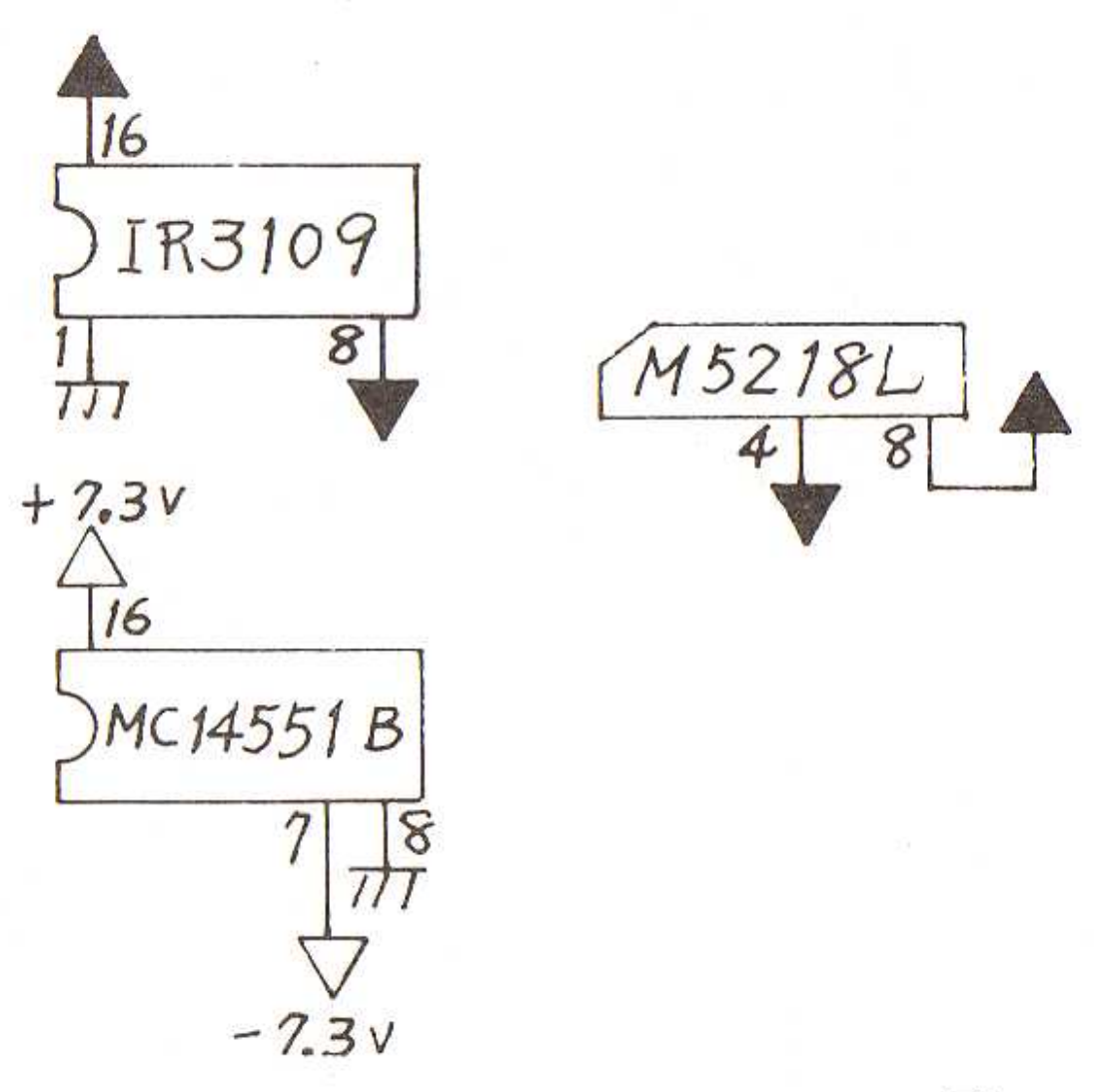
IMPROVING S/N RATIO

SN 290950—UP

R77	560	→	1.8K
R80	2.2K	→	3.3K
R81	100K	→	22K
R82	33K	→	6.8K
R83	4.7K	→	10K
C117	22P	→	150P

If conducting this modification on the unit SN280949 and below, proceed to 2. DC BAL in the adjustment section.

IC61	;	MC14551B
IC56A-56D, 57AB, 57CD	;	IR3109
IC57A-57D	;	M5218L
RA11A-11D, 14AB, 14CD	;	RM0891
RA12A-12D	;	RM0690
RA13A-13D	;	RM0688
D10, 11	;	1S2473


16
IR3109
1
8
+7.3v
16
MC14551 B
7
8
-7.3v
M5218L
4
8

CIRCUIT DIAGRAM MODULE BOARD SN 280650 and up

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COMPU-TUNE
Comparator
Analog SW
LATCH
ADDRESS PROM LATCH
LEVEL SHIFTER
ADDRESS DECODER
S/H
VCO
MIXER
VCF
1st VCA
2nd VCA
DC SUPPLY VCO
DC SUPPLY VCA
ANALOG SW
VCO A1
VCO A2
VCO B1
VCO B2
VCO C1
VCO C2
VCO D1
VCO D2
VCF
See attached VCF circuit diagram
TP1
TP2A
TP2B
TP2C
TP2D
TP3
TP4
TP5
IC 6
8031 or 8051
IC44 MC14551
IC4 HA17903PS
IC20 4051
IC7 273
IC8 273
IC11 ITS80141
IC12 TL081
IC1 373
2732A IC5
MC14504B IC10
IR9022 IC13
LS145 IC9
IC3 LS04
IC2 000
IC33A 3340
IC34A EHM-S226W83S
IC36A 3340
IC37A EHM-S226W83S
IC21 TL064
IC39 M5218L
M5218L IC40
M5230L IC55
IC53 μPC1252H2
M5218L IC54
MC14551 IC52
IC50A,B 3360
BA662 IC41A
BA662 IC42A
4053 IC35A
4053 IC38A
3360 IC43AB
IR9022 IC49AB
IC48CD
IC43CD
TC4051(S/H) Pins 7,8
DC BAL
OUTPUT LEVEL
D/A OFFSET
LINEARITY
RESONANCE
POSISTOR
VCA OUT M4J;23
CLK IN MC4;1
RESET MC4;6
TX MC4;7
RX MC4;5
LFO IN(T0) MC4;3
LFO IN(T1) MC4;4
D.GND MC4;2
D.GND MC4;8
VCA CONT M4J;24
NOISE IN M4J;21
VCF CONT M4J;25
VCO BEND 1 M4J;27
VCO BEND 2 M4J;26
A.GND M4J;22
(10V) REF M4P-1;14
+15V M4P-1;13
−15V M4P-1;12
A.GND M4P-1;11
D.GND M4P-1;10
+5V M4P-1;9
+15V M4P-2;20
−15V M4P-2;19
A.GND M4P-2;18
A.GND M4P-2;17
−15V M4P-2;16
−15V M4P-2;15
2VOICE ONLY
SN 333000-up
for perfect
DC BALANCE
Pin No.
IC No.
MC14551
MC14551 (PWM)
MC14504B
CEM3340
HA17903PS
TC4053BP
IR9022
IR3109
LS145
TL064
BA662
40H373
40H273
M5218L
HD14051
TL081
40H000
LS04

A, B; MODULE BOARD (4 Voices) 149H180
C, D etch mask 052H403A/B

A, B; MODULE BOARD (2 Voices) 149H181
etch mask 052H403A/B

SN 280650 and up

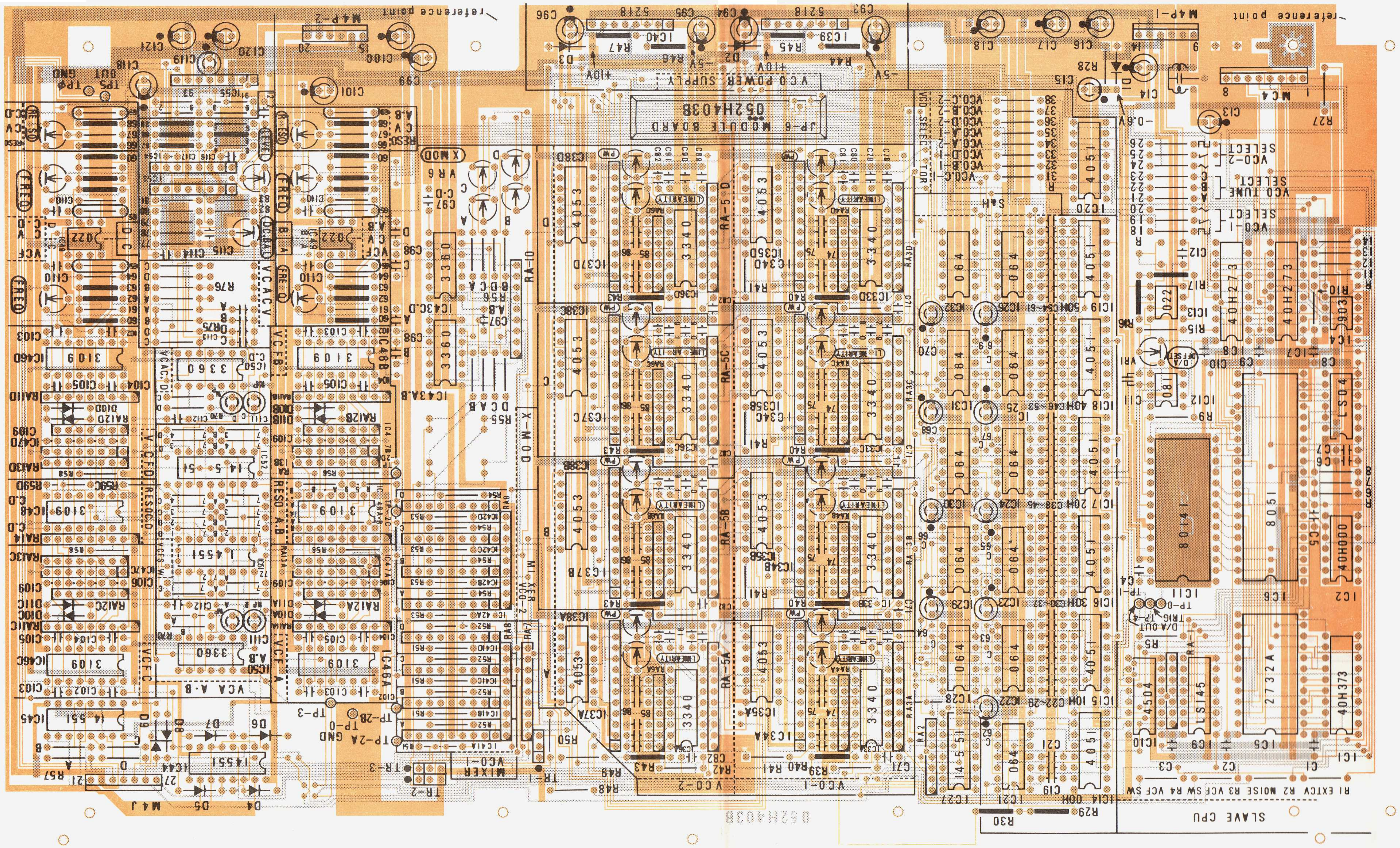
The later PCBs having CPU P8051-319 for IC6 do not require IC1 and IC5.
To enable the internal PROM. EA(pin31) of P8051 is pulled up through 10k ohms.
NOTE: P8051 without -319 must be treated as P8031

IC1	:TC40H373P	IC2	:TC40H000P
IC3	:74LS04	IC4	:HA17903PS
IC5	:2732A-B	IC6	:P8031
IC7, 8	:TC40H273P	IC9	:74LS145
IC10	:MC14504B	IC11	:ITS80141
IC12	:TL081	IC13, 49AB, 49CD	:IR9022
IC14-20	:HD14051BP	IC21-26, 28-32	:TL064
IC27, 44, 45, 52	:MC14551B	IC33A, 33B, 33C, IC33D, 36A, 36B, IC36C, 36D	:CEM3340
IC34A, 34B, 34C, IC34D, 37A, 37B IC37C, 37D	:EHM-S226W83S	IC39, 40, 54	:M5218L
IC35A, 35B, 35C, IC35D, 38A, 38B, IC38C, 38D	:TC4053BP	IC41A, 41B, 41C, IC41D, 42A, 42B IC42C, 42D	:BA662
IC43A, 43B, 43C, IC43D, 50A, 50B IC50C, 50D	:CEM3360	IC53	:uPC1252H2
		IC55	:M5230L
RA2	:DAP-601	RA3A, 3B, 3C, 3D RA5A, 5B, 5C, 5D	:RM0889
RA4A, 4B, 4C, 4D, RA6A, 6B, 6C, 6D	:RM0689	RA7, RA10	:RM8-333J
		RA8, RA9	:RM8-102J
TR1, 2, 3	:2SA937Q or R	D1-9	:1S2473

Highest ref des :IC54, TR3, D9, C119, R93, RA10, VR11

VCF CIRCUIT (detail)

A
B
C
D
41A
42A
R58A 22K
RA12A ½
C107 5P
RA13A ½
IC48AB ¼ IR3109
33K R59A
RA14AB ¼
RA11A
47A
46A
RA11A
46A
46B
R71A 56K
56K R72A
IC51
¼ IC51 MC14551B
C102A P330P
C104A P330P
33P C106
½ IC47A ½ M5218L
¼ IC46A ¼ IR3109
C108 5P
RA13A ½
IC48AB ¼ IR3109
RA14AB ¼
½ IC47A M5218L
RA11A
C105A P330P
RA11A
C103A P330P
D11A
D10A
33P C109
IC46B ¼ IR3109
RA12A ½
R73A 10K
10K R74A
IC52
51


JP-6 MODULE BOARD
052H403B
VCO POWER SUPPLY
SLAVE CPU
M4P-1
M4P-2
M4J
MC4
reference point
VCO SELECTOR
VCO-1
VCO-2
MIXER
X-MOD
4053
3340
064
4051
3109
3360
14551
8051
4504
LS145
2732A
40H373
40H000
40H273
80141
LS04

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SERIAL NUMBER 311800 AND UP

MODULE BOARD

4-VOICE (149H180B)

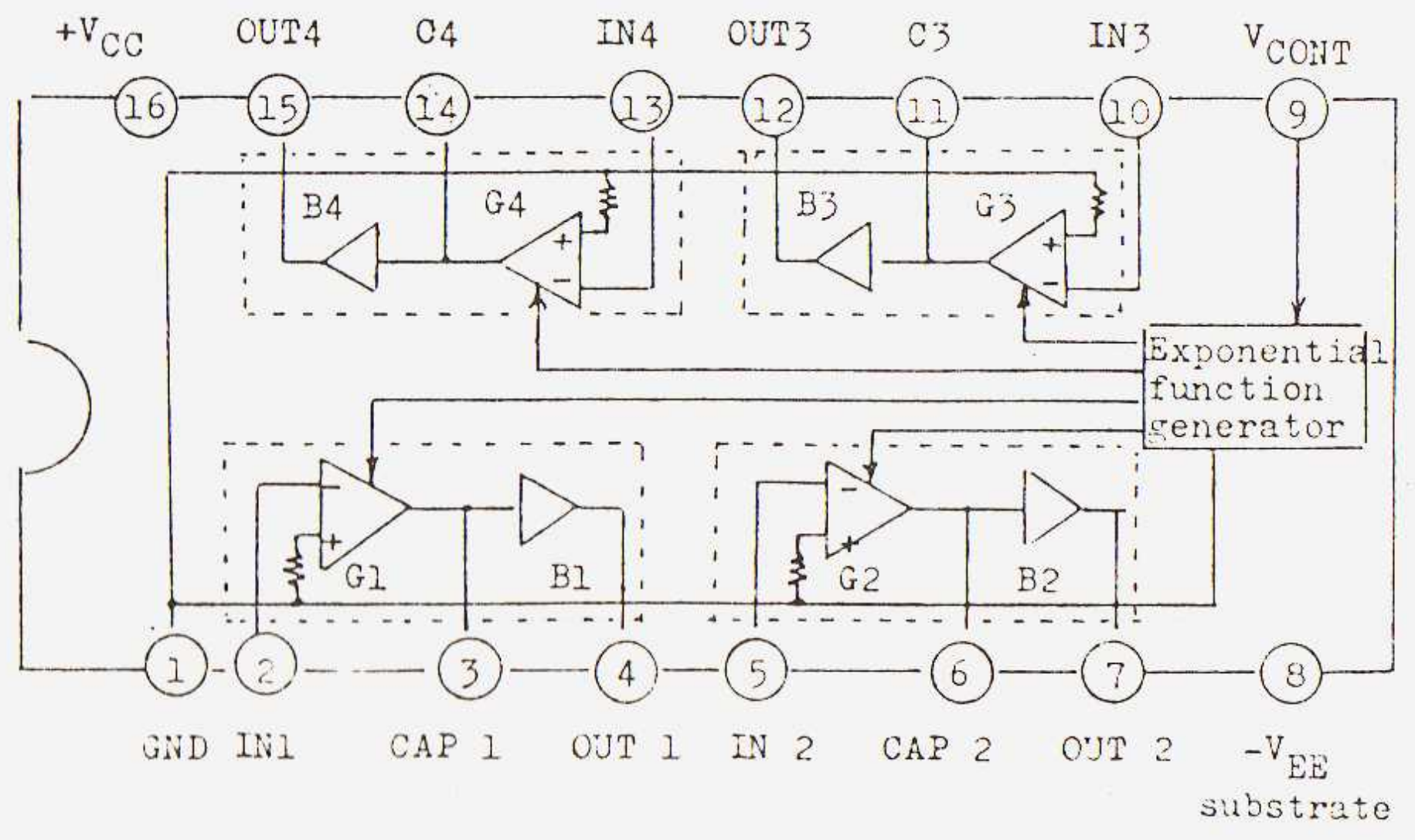
2-VOICE (149H181B)

(pcb 052H403B)

SERIAL NUMBER 280650-311799
(pcb 052H403A)

Similar to vertion B except some components are surface mounted on the foil side.

1R3109
(top view)


+VCC
OUT4
C4
IN4
OUT3
C3
IN3
VCONT
16
15
14
13
12
11
10
9
B4
G4
B3
G3
Exponential function generator
G1
B1
G2
B2
1
2
3
4
5
6
7
8
GND
IN1
CAP 1
OUT 1
IN 2
CAP 2
OUT 2
-VEE substrate

IC51 ; MC14551B
IC46A-46D, 48AB, 48CD ; IR3109
IC47A-47D ; M5218L

RA11A-11D, 14AB, 14CD ; RM0891
RA12A-12D ; RM0690
RA13A-13D ; RM0688
D10, 11 ; 1S2473

PANEL(L)BOARD (149H183A) (pcb 052H405A)

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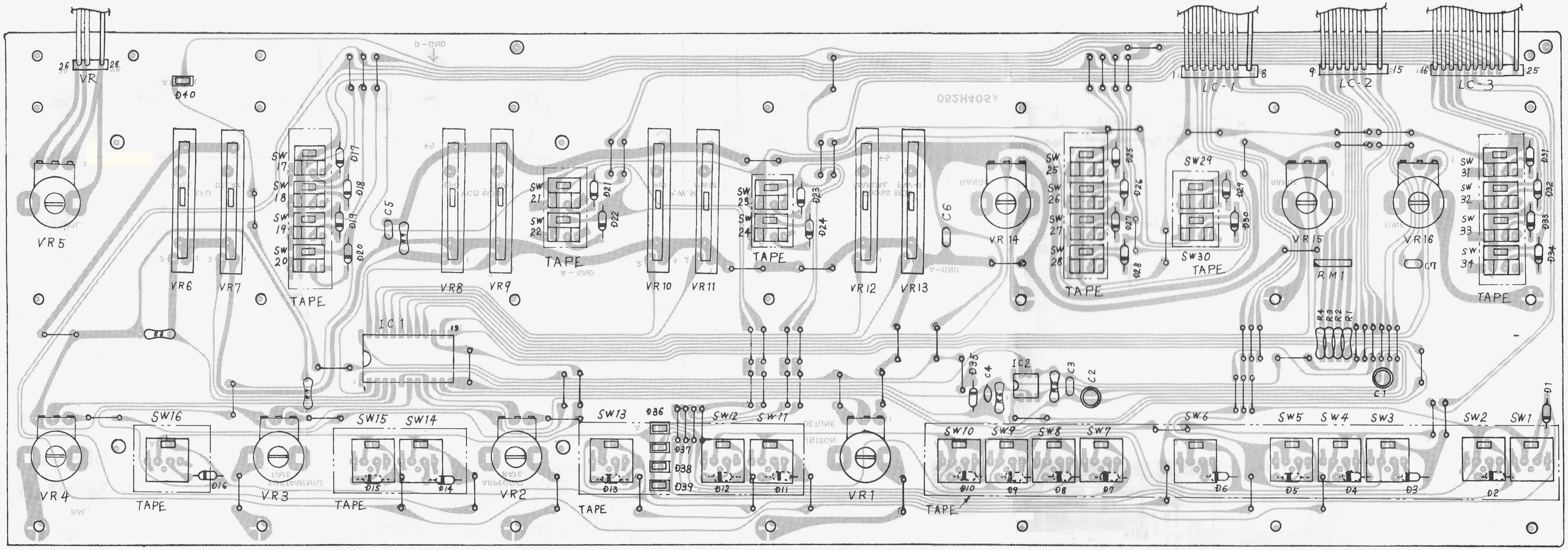
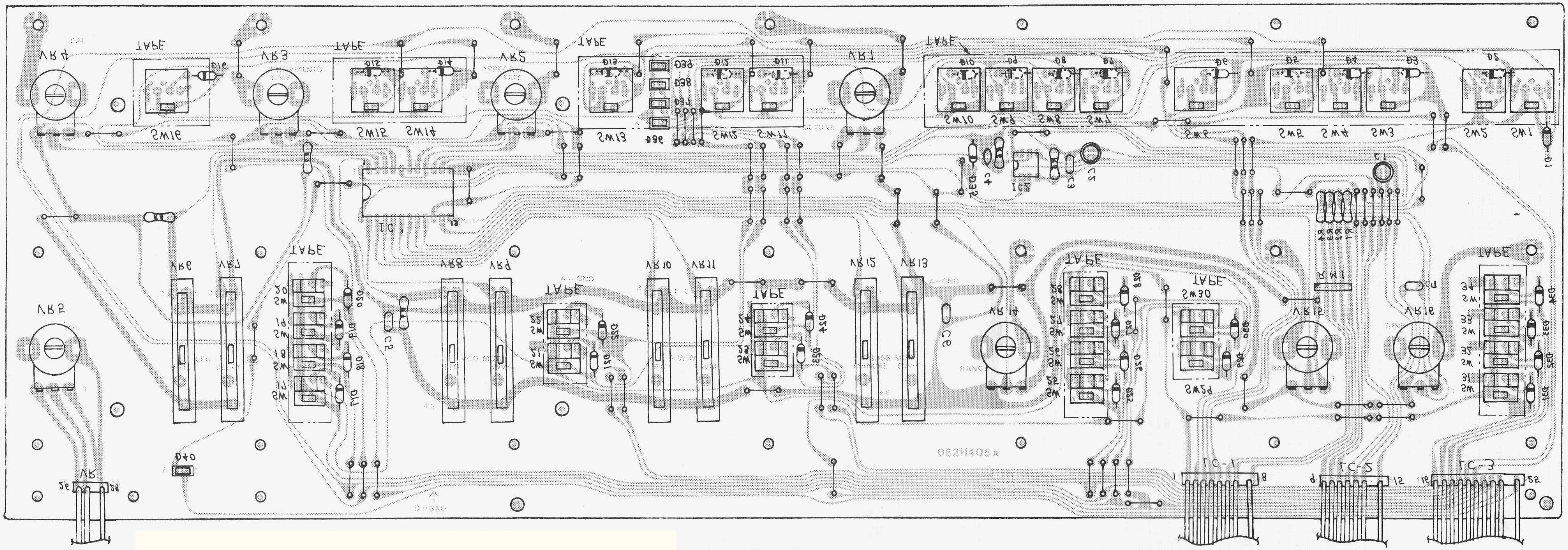

VR
26
28
D40
D-GND
052H405A
LC-1
1
8
LC-2
9
15
LC-3
16
25
VR5
VR6
VR7
SW 17
SW 18
SW 19
SW 20
D17
D18
D19
D20
TAPE
C5
VR8
VR9
SW 21
SW 22
D21
D22
TAPE
A-GND
VR10
VR11
SW 23
SW 24
D23
D24
TAPE
VR12
VR13
A-GND
C6
VR14
SW 25
SW 26
SW 27
SW 28
D25
D26
D27
D28
TAPE
SW29
SW30
D29
D30
TAPE
VR15
RM1
VR16
C7
SW 31
SW 32
SW 33
SW 34
D31
D32
D33
D34
TAPE
R4
R3
R2
R1
IC1
IC2
D35
C4
C3
C2
C1
D1
SW16
D16
VR4
BAL
TAPE
VR3
FINE
PORTAMENTO
SW15
SW14
D15
D14
TAPE
VR2
ARPEGGIO
RATE
SW13
D13
D36
D37
D38
D39
TAPE
SW12
SW11
D12
D11
DETUNE
UNISON
VR1
SW10
SW9
SW8
SW7
D10
D9
D8
D7
TAPE
SW6
D6
SW5
SW4
SW3
D5
D4
D3
SW2
SW1
D2



View from foil side

Document scanning and editing by
Larry Hendry - www.wiseguysynth.com

LC-2 PANEL VR
9 8 7 6
VCO-2
VCO-1
PWM
VCO MOD
LFO-1
GLIDE
ARP.
ASSIGN
100 KB x 16
CROSS MOD
TUNE
RANGE
RANGE
ENV-1
MAN
PWM
PW
ENV-1
LFO
DELAY
RATE
BAL.
TIME
RATE
UNISON DETUNE
VOL.
VR 16
VR 15
VR 14
VR 13
VR 12
VR 11
VR 10
VR 9
VR 8
VR 7
VR 6
VR 4
VR 3
VR 2
VR 1
VR 5
47K R9
47K R8
1.8 K R10
33K R7
C7 .01
C5 .01
33K x4
R1 R2 R3 R4
RM-1
1M x 4
26 VR IN
27 OUT
28 A.GND
IC 1
CD4067B
INH
COM
24
※ SN 280800 and up
.01 C6
IC2
D35 1S2473
1M R5
.01 C3
10 LC-2 REF. +5V
11 VR. DATA
14 +15V
13 A.GND
15 -15V
12 LFO LED
25 LC-3 D. GND
IC2
IR9022
33P C4
1M R6
D40
GL 9HD12
MATRIX CIRCUIT
DECODER 7 LC-3,24
6 LC-1,1
5 2
0 3
2 4
1 5
D.SW 29
D.SW 30
D.SW 31
D.SW 32
D.SW 33
NOISE D.SW 34
D.SW 25
D.SW 26
D.SW 27
D.SW 28
ENV D.SW 23
LFO D.SW 24
VCO-1 D.SW 21
VCO-2 D.SW 22
D.SW 17
D.SW 18
D.SW 19
RNDM D.SW 20
WHOLE D.SW 3
SP-2 D.SW 4
SP-1 D.SW 5
ARP RANGE D.SW 13
UP D.SW 1
LOW D.SW 2
PL-2 D.SW 7
PL-1 D.SW 8
UNISON D.SW 9
SOLO D.SW 10
DOWN D.SW 11
UP D.SW 12
1 D 39
2 D 38
3 D 37
4 D 36
HOLD D.SW 6
GLISS D.SW 14
PORTA D.SW 15
BEND D.SW 16
GL 9HD2
1S2473
BUS 7 LC-3,16
17 18 19 20 21 22 23
6 5 4 3 2 1 0
1.2.3.4
GL9HD12
KNOB H85-88
KNOB H95
LED
SW

IC 1 : CD4067B
IC 2 : IR9022

SERIAL NUMBER 250100-311799 (pcb 052H406B)
Similar to version C except the absence of R24, R25, R26, R47, TR3.

RC3
RC1
RC2
052 H 406
C3
C4
IC3
C5
D26
C6
R13
C7
R18
TR2
R19
R20
VR2
SW20
SW21
D20
C2
MIXER
D21
SW22
SW23
D23
D22
VR3
VR4
VR5
VR6
VR7
ACF
VR8
VR9
ACA
LEVEL
A-GND
D24
R14
R15
R16
R17
SW24
SW25
R24
R25
D25
R26
TR3
VR10
VR11
VR12
VR13
C8
VR14
VR15
VR16
VR17
VR18
VR19
R21
R22
R23
R1
R2
R3
R4
IC1
IC2
C1
VR1
D19
D18
D17
D16
D15
D14
D13
D12
D11
D10
D9
D8
D7
D6
D5
D4
D2
D1
SW19
SW18
SW17
SW16
SW15
SW14
SW13
SW12
SW11
SW10
SW9
SW8
SW7
SW6
SW5
SW4
SW3
SW2
SW1
R6
D27
TR1
R5
R7
D3

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SERIAL NUMBER 31180 AND UP

PANEL(R)BOARD (149H184C) (pcb 052H406C)

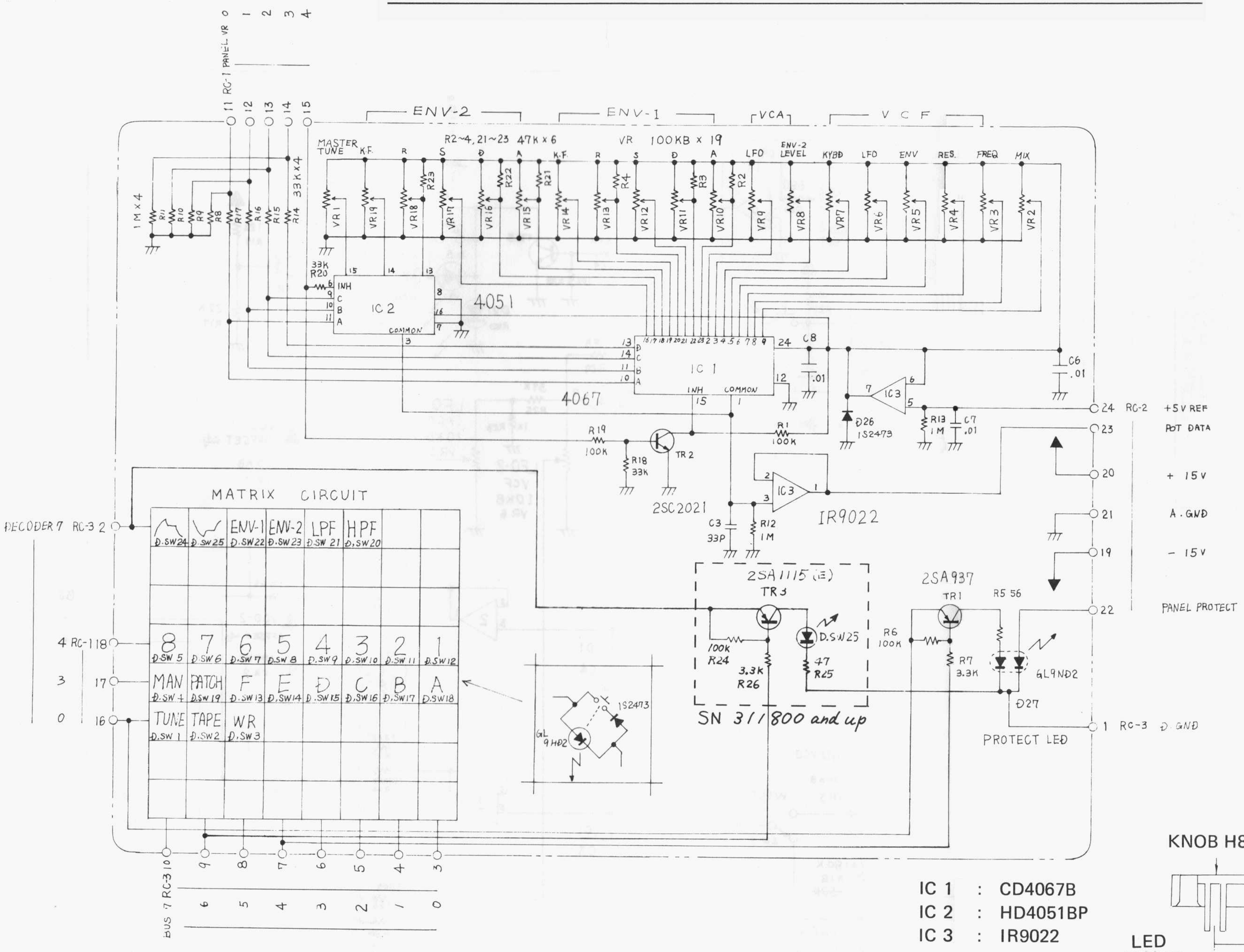
View from foil side

IMPROPER SWITCH SCANNING IN THE TAPE MODES

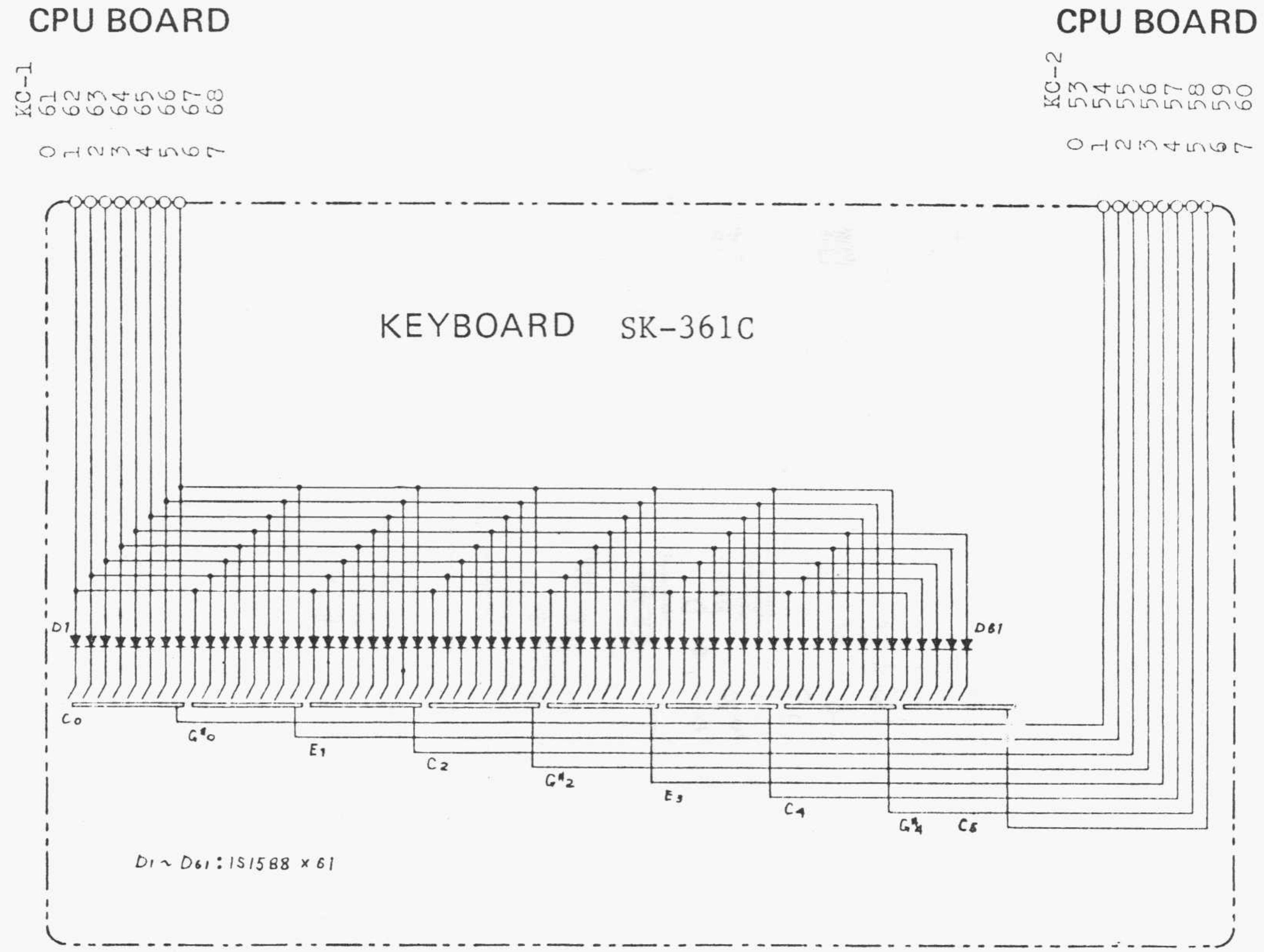
In early JP–6 the program in either "SAVE" "VERIFY" or "LOAD" sequence sometimes cannot escape the mode even when TAPE is pressed for canceling TAPE mode. This is due to the fact that TAPE contact is not sensed by the switch scanning. To cure this problem the factory modifies the circuitry by adding TR3, R24—R26 on the Panel board R as shown in the diagram.

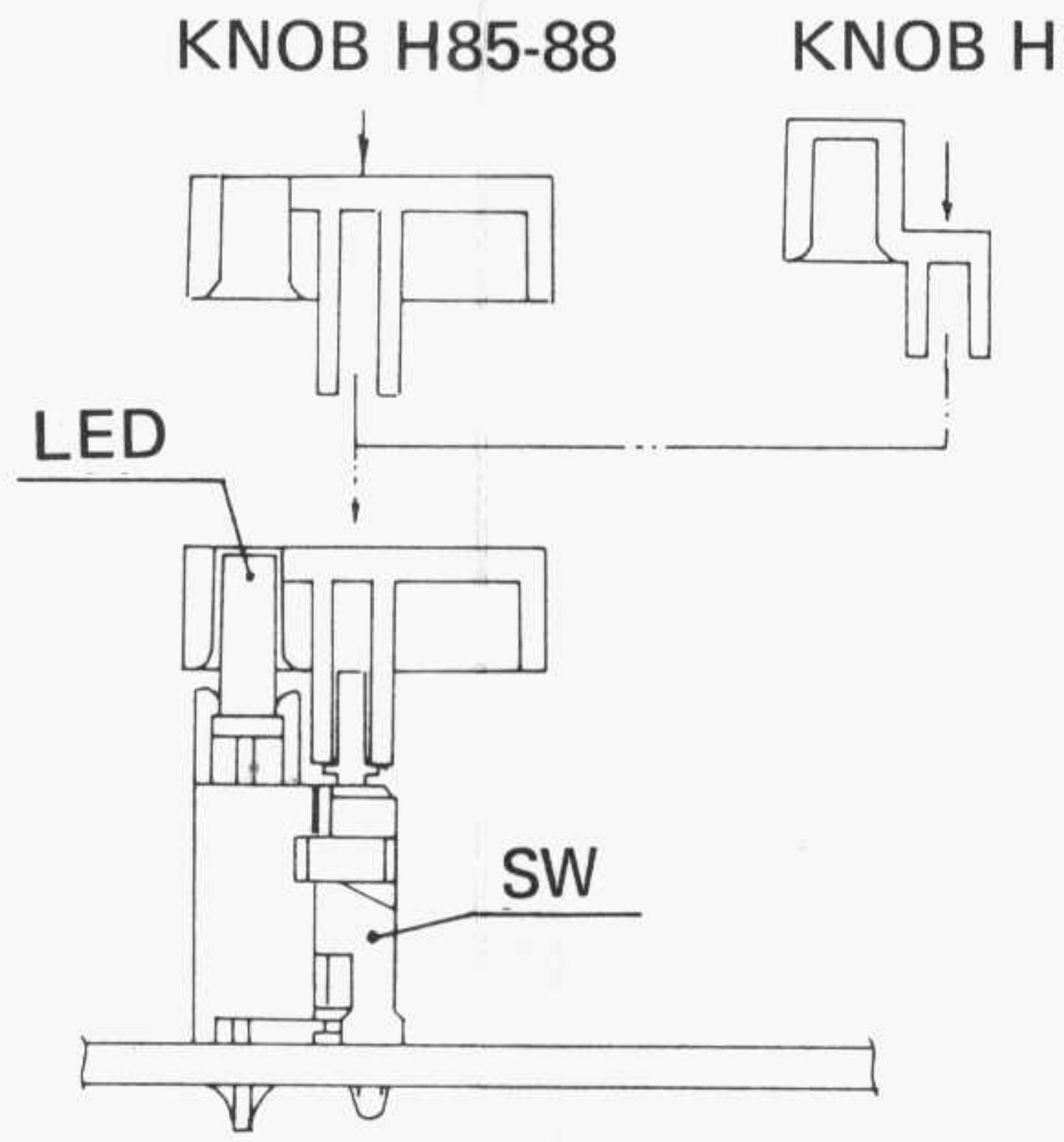
For the products SN prior to 311800, an alternative modification shown in CPU BOARD layout should be conducted for easier retorfit.

Remember that replacing CPU IC12 (CPU board) P8031 or P8051, with P8051-318 version does not cure the problem.


RC-1 PANEL VR 0 1 2 3 4
11 12 13 14 15
ENV-2
ENV-1
VCA
VCF
MASTER TUNE
K.F.
R
S
D
A
R2~4, 21~23 47K x 6
VR 100KB x 19
LFO
ENV-2 LEVEL
KYBD
ENV
RES.
FREQ
MIX
1M x 4
R11 R10 R9 R8
R17 R16 R15 R14 33K x 4
VR1 VR19 VR18 VR17 VR16 VR15 VR14 VR13 VR12 VR11 VR10 VR9 VR8 VR7 VR6 VR5 VR4 VR3 VR2
33K R20
INH
IC 2
4051
COMMON
IC 1
4067
C8 .01
C6 .01
IC3
D26 1S2473
R13 1M
C7 .01
R19 100K
R18 33K
TR2
2SC2021
R1 100K
IC3
IR9022
C3 33P
R12 1M
24 RC-2 +5V REF
23 POT DATA
20 +15V
21 A.GND
19 -15V
22 PANEL PROTECT
1 RC-3 D GND
MATRIX CIRCUIT
DECODER 7 RC-3 2
D.SW24 D.SW25
ENV-1 D.SW22
ENV-2 D.SW23
LPF D.SW21
HPF D.SW20
4 RC-1 18
8 D.SW5
7 D.SW6
6 D.SW7
5 D.SW8
4 D.SW9
3 D.SW10
2 D.SW11
1 D.SW12
3 17
MAN D.SW4
PATCH D.SW19
F D.SW13
E D.SW14
D D.SW15
C D.SW16
B D.SW17
A D.SW18
0 16
TUNE D.SW1
TAPE D.SW2
WR D.SW3
GL 9HD2
1S2473
2SA1115 (E)
TR3
100K R24
3.3K R26
D.SW25
47 R25
SN 311800 and up
2SA937
TR1
R5 56
R6 100K
R7 3.3K
GL9ND2
D27
PROTECT LED
BUS 7 RC-3 10 9 8 7 6 5 4 3
6 5 4 3 2 1 0

IC 1 : CD4067B
IC 2 : HD4051BP
IC 3 : IR9022


CPU BOARD
CPU BOARD
KC-1 61 62 63 64 65 66 67 68
0 1 2 3 4 5 6 7
KC-2 53 54 55 56 57 58 59 60
0 1 2 3 4 5 6 7
KEYBOARD SK-361C
D1
D61
C0
G#0
E1
C2
G#2
E3
C4
G#4
C6
D1 ~ D61 : 1S1588 x 61


KNOB H85-88
KNOB H95
LED
SW

JP-6

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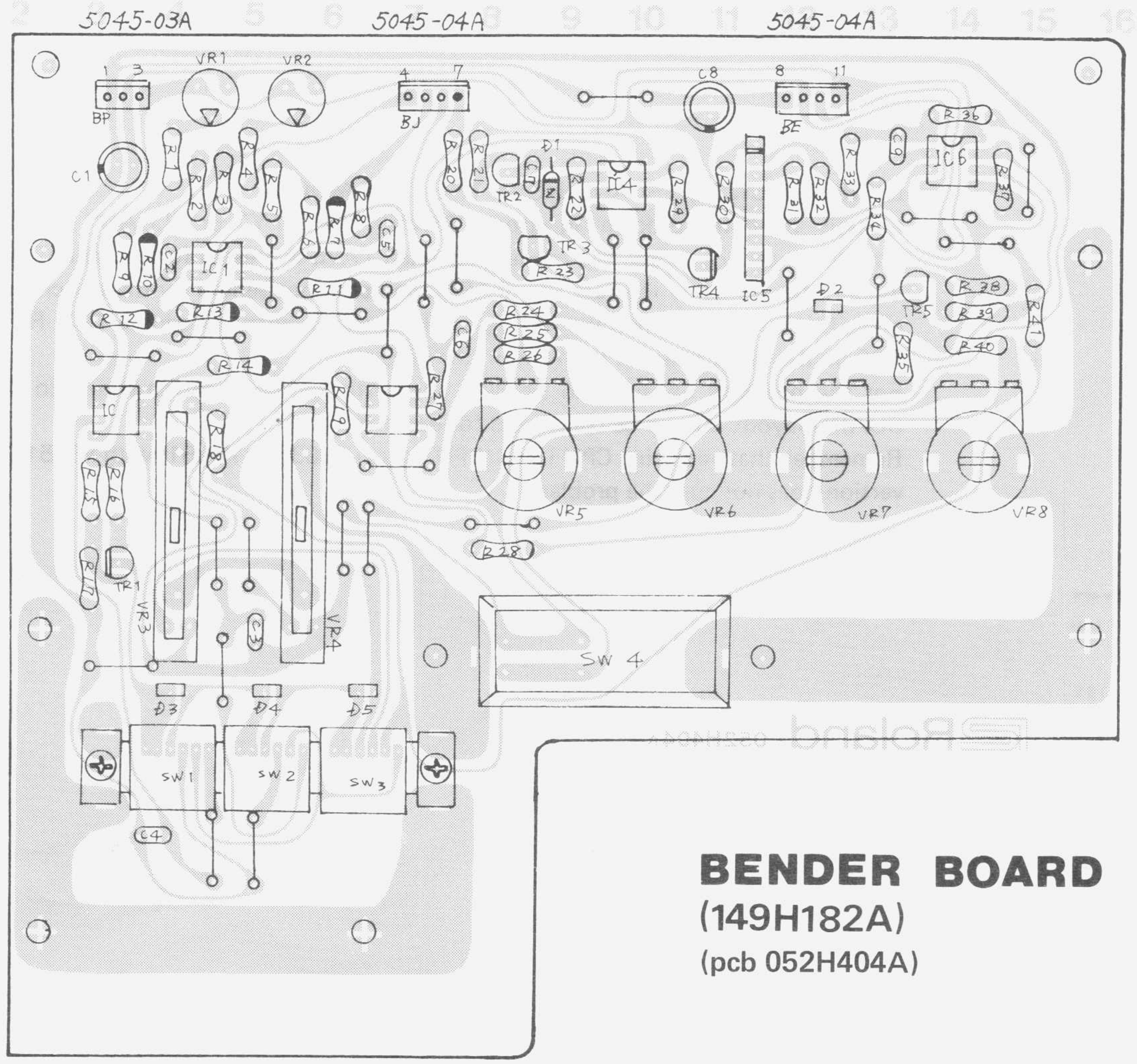
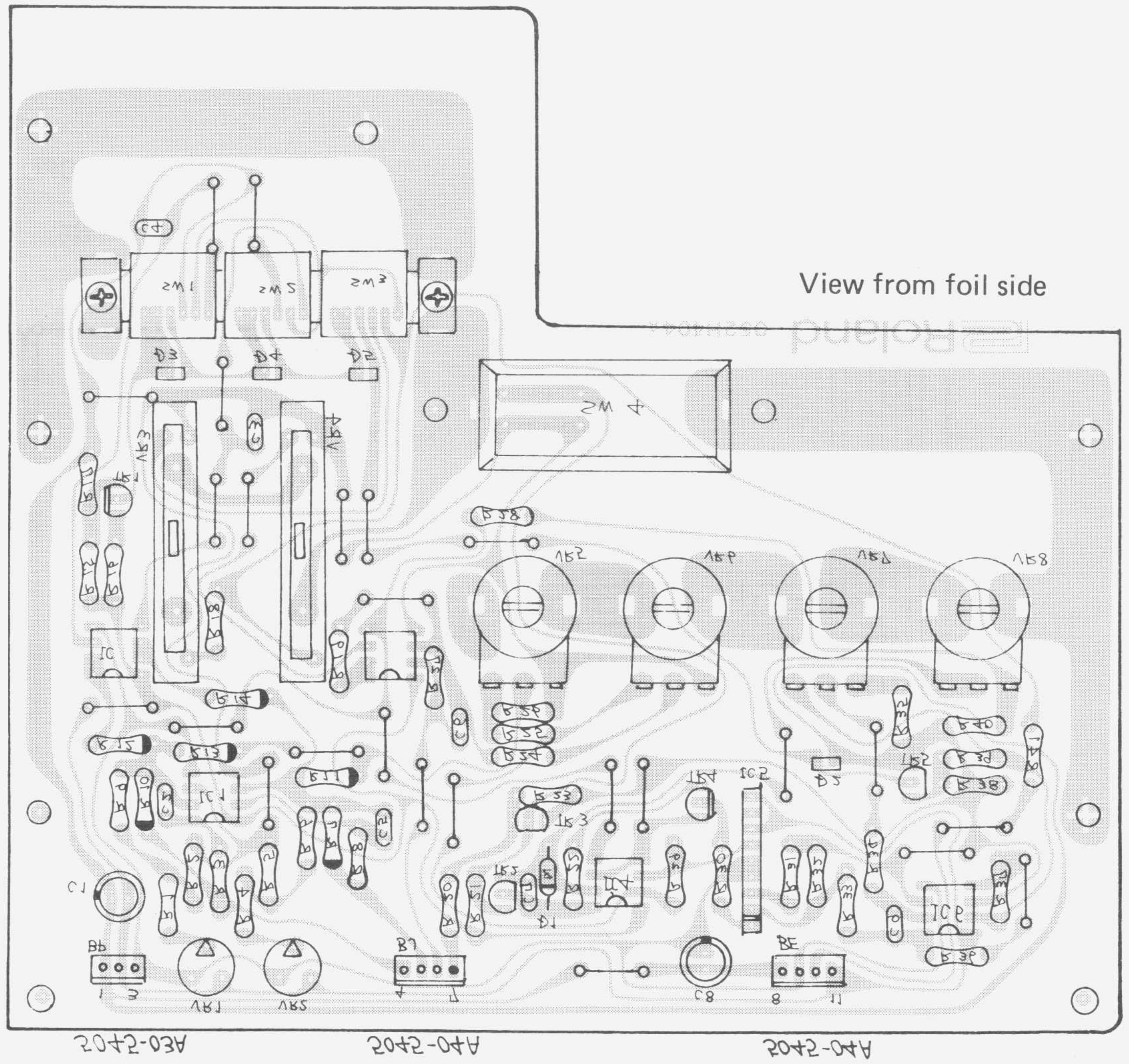
JUN. 13, 1983


5045-03A
5045-04A
5045-04A
BP
BJ
BE
VR1
VR2
C8
C1
IC1
IC4
IC5
IC6
D1
D2
D3
D4
D5
TR1
TR2
TR3
TR4
TR5
VR3
VR4
VR5
VR6
VR7
VR8
SW 4
SW1
SW2
SW3
C4
R28

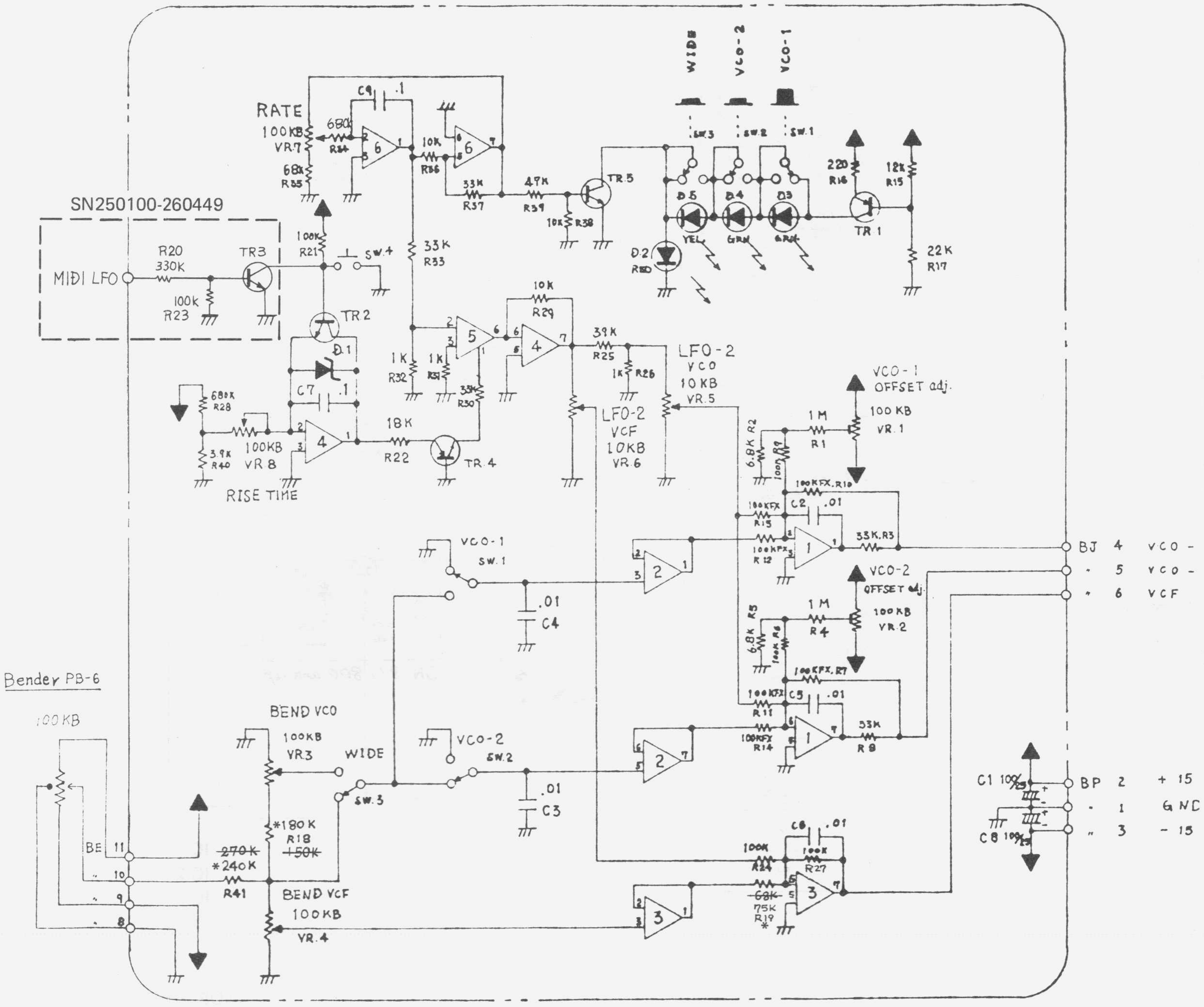
BENDER BOARD

(149H182A)

(pcb 052H404A)


C1
C8
IC1
SW4
BP
BJ
BE

View from foil side


WIDE
VCO-2
VCO-1
RATE
100KB VR7
68K R35
680 R34
C9 .1
10K R36
33K R37
47K R39
10K R38
TR5
SW.3
SW.2
SW.1
D5 YEL
D4 GRN
D3 GRN
D2 RED
220 R16
12K R15
22K R17
TR1
SN250100-260449
MIDI LFO
R20 330K
100K R23
TR3
100K R21
SW.4
33K R33
TR2
D1
C7 .1
680K R28
3.9K R40
100KB VR8
RISE TIME
18K R22
TR4
10K R29
39K R25
1K R26
1K R32
1K R31
33K R30
LFO-2
VCO 10KB VR.5
LFO-2 VCF 10KB VR6
VCO-1 OFFSET adj.
100 KB VR.1
1 M R1
6.8K R2
100K R9
100KFX R10
C2 .01
100KFX R13
100KFX R12
33K R3
VCO-1 SW.1
.01 C4
VCO-2 OFFSET adj.
100KB VR.2
1 M R4
6.8K R5
100K R6
100KFX R7
C3 .01
100KFX R11
100KFX R14
33K R8
Bender PB-6
100KB
BEND VCO
100KB VR3
WIDE
VCO-2 SW.2
SW.3
.01 C3
*180K R18 150K
270K *240K R41
BE 11 10 9 8
BEND VCF 100KB VR.4
C6 .01
100K R24
100K R27
68K 75K R19
BJ 4 VCO-
5 VCO-
6 VCF
BP 2 +15
1 GND
3 -15
C1 10μ
C8 10μ

* SN280850 and up

VR3,VR4 —— S3018P405-B15 (100KB)

VR7,VR8 —— EVH5XAB15 B15 (100KB)

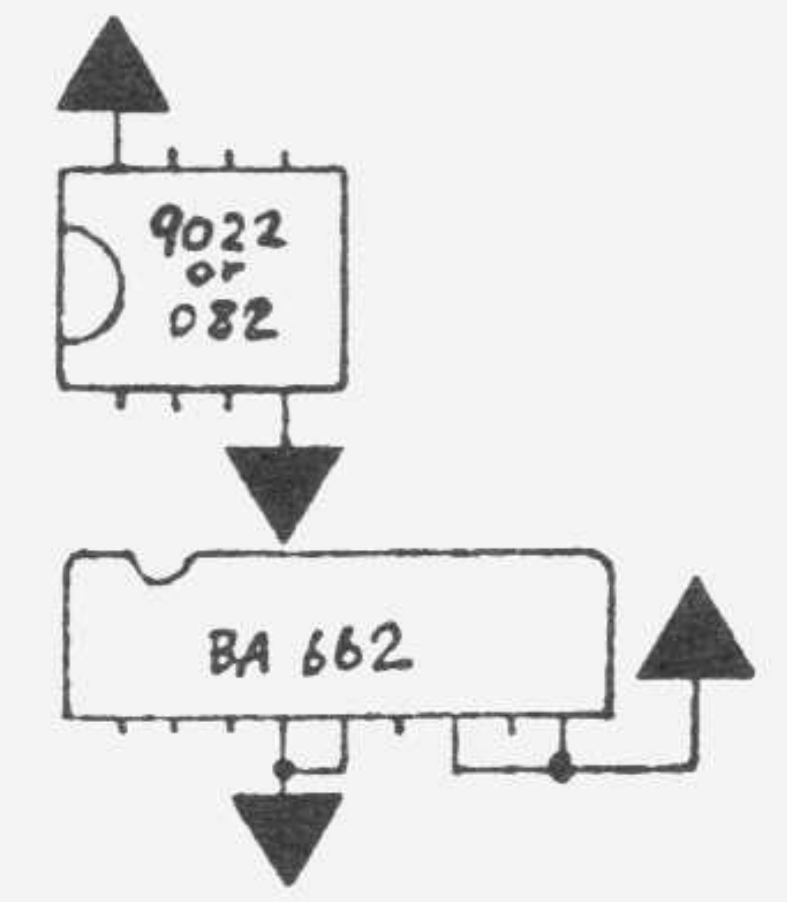
VR5,VR6 —— EXV5XAB15 B14 (10KB)

SW4 — KEH10003 (Ass'y)

SW1,SW2,SW3 —— SUT32A-4 (Ass'y)

UNLESS OTHERWISE SPECIFIED
ALL PNP TRANSISTORS ARE 2SA937-Q or 2SA1115-E
ALL NPN TRANSISTORS ARE 2SC2021-Q or 2SC2603-E

IC 1,4,6 : IR9022
IC 2,3 : 082
IC 5 : BA662
D 1 : 05Z11X


9022 or 082
BA 662

View from foil side

NJ
JP-2
VR
TR4
JP-1
TR2
JM-1
TR3
C10
TR5
JM-2
IC5
IC6
JC
TR1
IC1
L1
IC4
IC3
IC2
SW1
JK1
JK2
JK3
JK4
JK5
JK6
JK7
JK8
JK9
SW2
JK-10
JK-11
IC7
052H408C
Roland

JACK BOARD
(149H186C)
(pcb 052H408C)

INCREASING OUTPUT LEVEL
SN 290950—UP
Changing R15 across IC4 pins from 15k to 30k doubles signal amplitude at OUTPUT and PHONES jacks.

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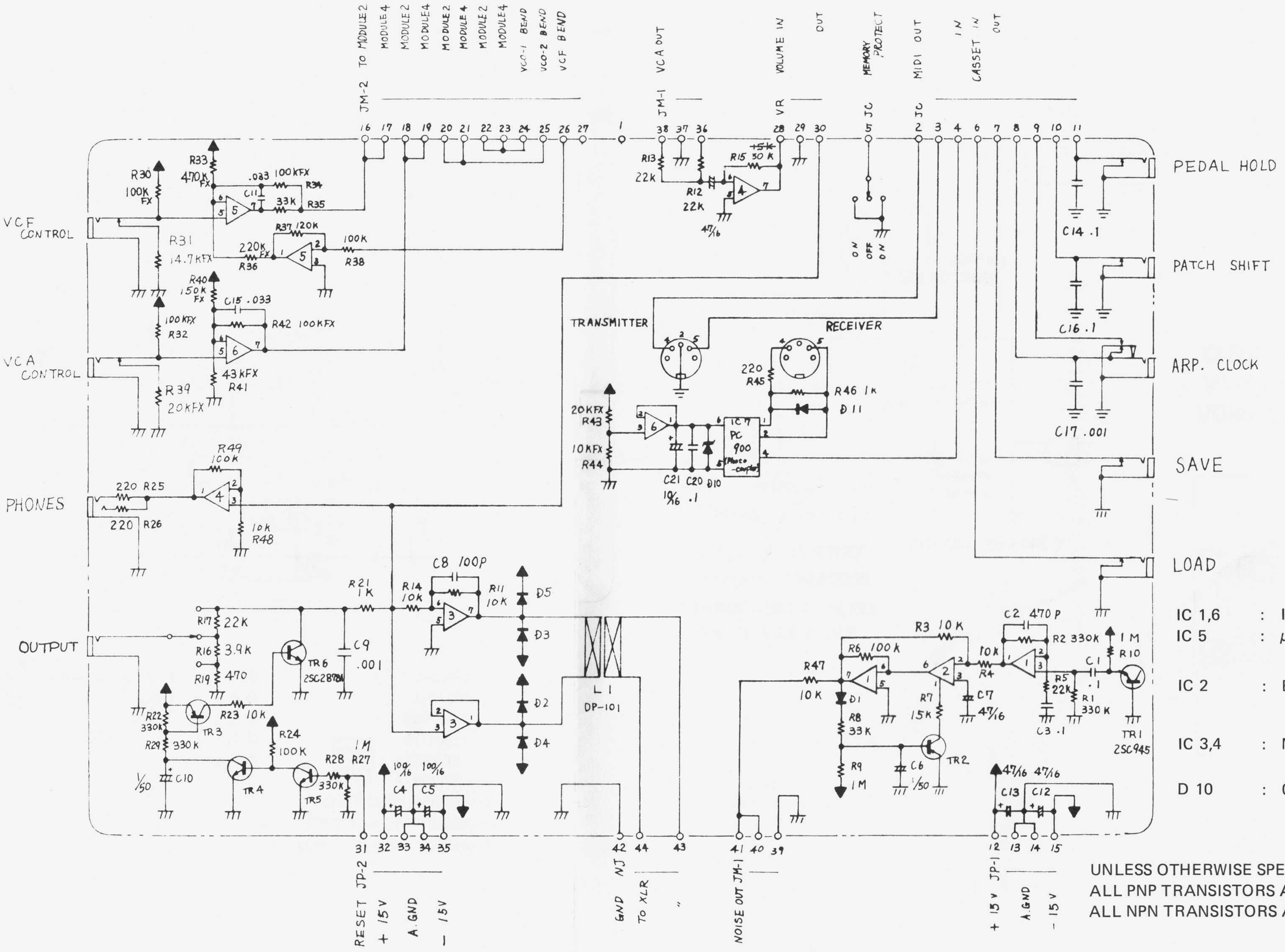
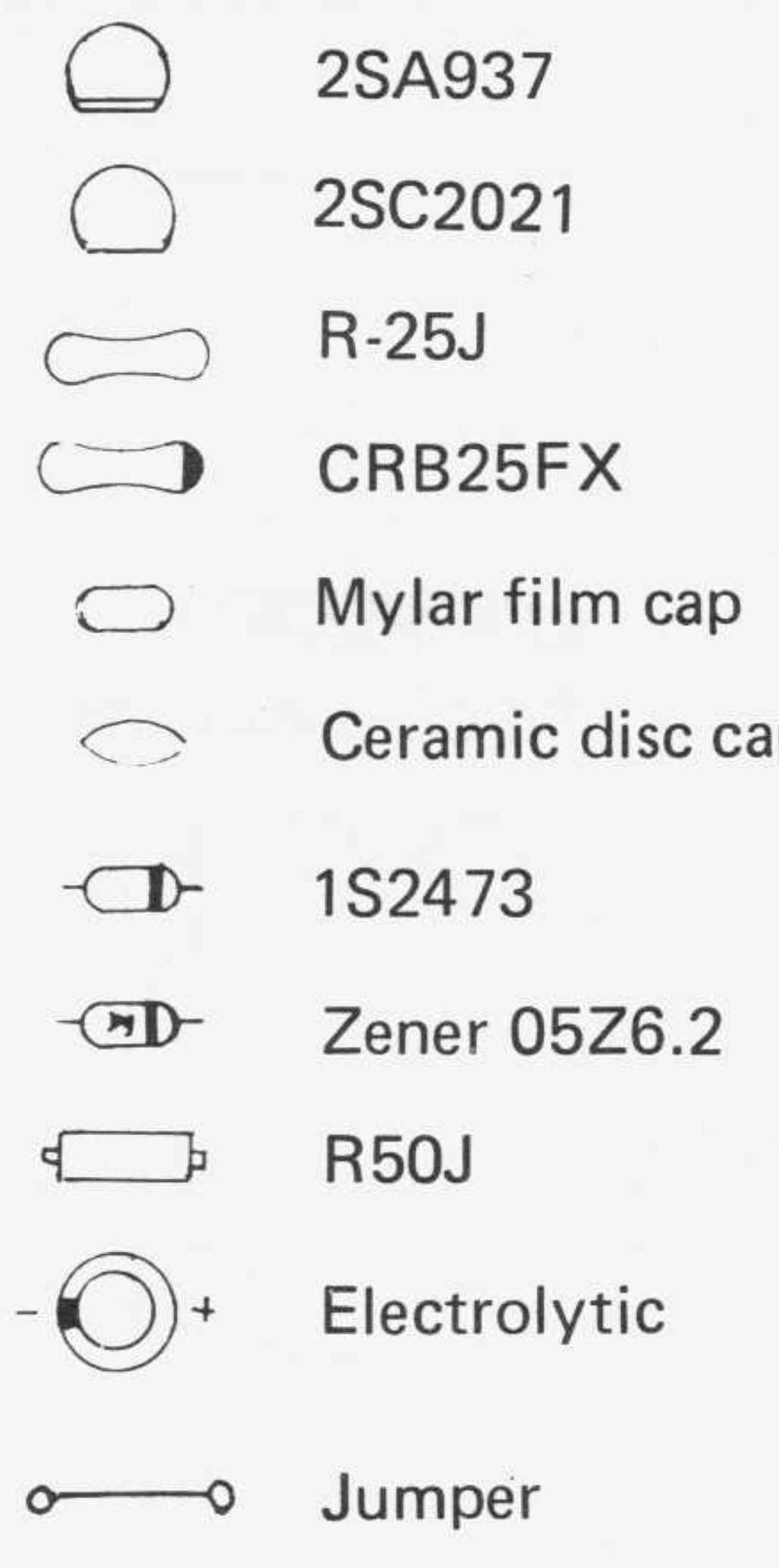
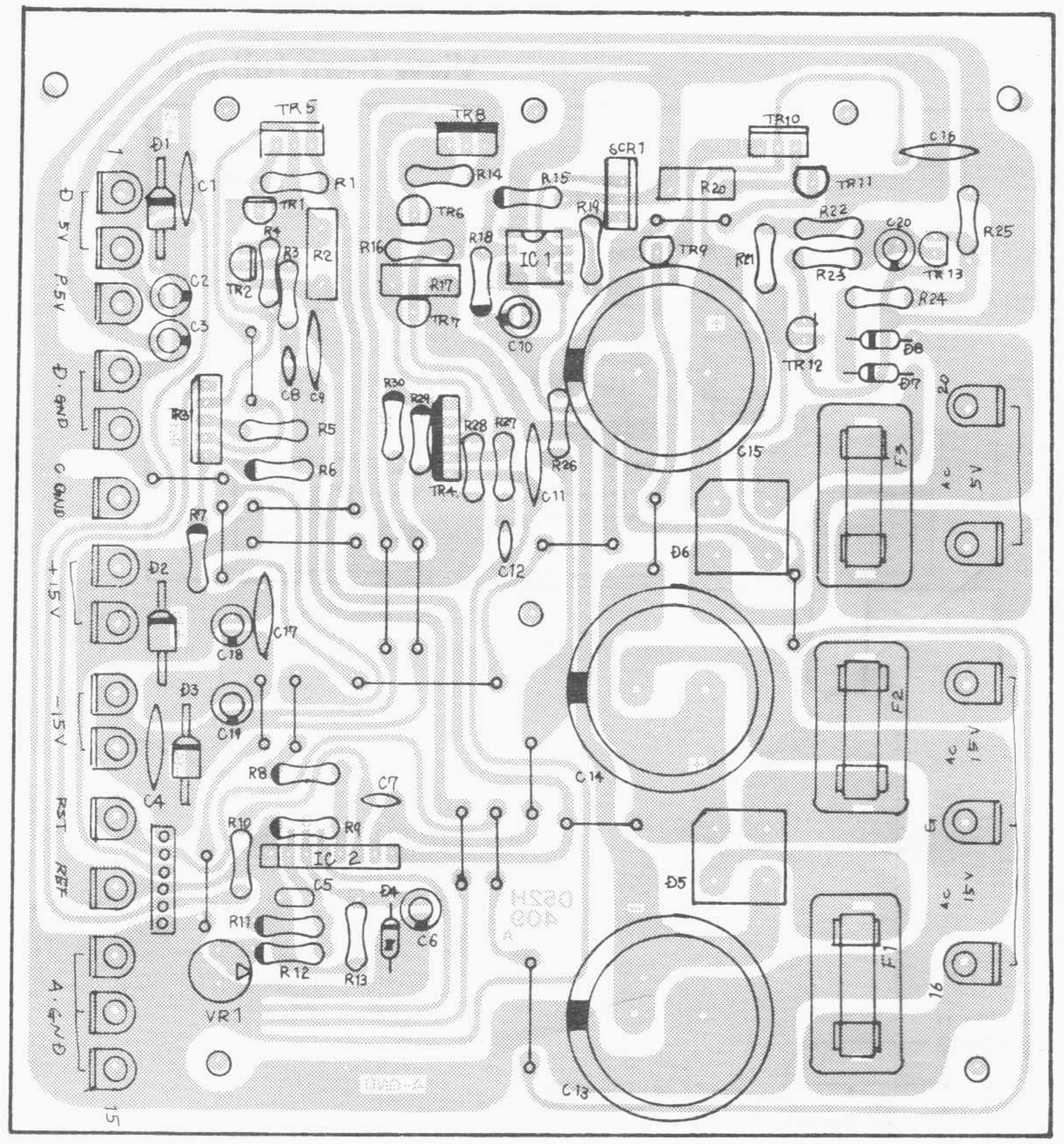

JM-2 TO MODULE 2
MODULE 4
MODULE 2
MODULE 4
MODULE 2
MODULE 4
MODULE 2
MODULE 4
VCO-1 BEND
VCO-2 BEND
VCF BEND
JM-1 VCA OUT
VR VOLUME IN
OUT
JC MEMORY PROTECT
JC MIDI OUT
IN
CASSET IN
OUT
16 17 18 19 20 21 22 23 24 25 26 27
1
38 37 36
28 29 30
5
2 3 4 6 7 8 9 10 11
PEDAL HOLD
PATCH SHIFT
ARP. CLOCK
SAVE
LOAD
VCF CONTROL
VCA CONTROL
PHONES
OUTPUT
R30 100K FX
R33 470K FX
.033 C11
100KFX R34
33K R35
R37 120K
220K R36
100K R38
R31 14.7KFX
R40 150K FX
C15 .033
100KFX R32
R42 100KFX
43KFX R41
R39 20KFX
R13 22K
R12 22K
R15 ~~15K~~ 30K
47/16
ON OFF ON
C14 .1
C16 .1
C17 .001
TRANSMITTER
RECEIVER
220 R45
R46 1K
D11
20KFX R43
10KFX R44
IC7 PC 900 Photo-coupler
C21 10/16
C20 .1
D10
R49 100K
220 R25
220 R26
10K R48
C8 100P
R21 1K
R14 10K
R11 10K
D5
D3
D2
D4
L1 DP-101
R17 22K
R16 3.9K
R19 470
C9 .001
TR6 2SC2878A
R22 330K
TR3
R23 10K
R29 330K
R24 100K
1/50 C10
TR4
TR5
R28 330K
R27 1M
C4 100/16
C5 100/16
R3 10K
C2 470P
R6 100K
R47 10K
D1
R8 33K
R9 1M
R7 15K
C7 47/16
C6 1/50
TR2
R4 10K
R5 22K
R2 330K
C3 .1
R1 330K
C1 .1
R10 1M
TR1 2SC945
C13 47/16
C12 47/16
31 32 33 34 35
42 44 43
41 40 39
12 13 14 15
JP-2 RESET
+15V
A.GND
-15V
NJ GND
TO XLR
JM-1 NOISE OUT
JP-1 +15V
A.GND
-15V

IC 1,6	:	IR9022
IC 5	:	μPC4558
IC 2	:	BA662
IC 3,4	:	M521BL
D 10	:	0.5Z6.2


2SA937
2SC2021
R-25J
CRB25FX
Mylar film cap
Ceramic disc cap
1S2473
Zener 05Z6.2
R50J
Electrolytic
Jumper

UNLESS OTHERWISE SPECIFIED
ALL PNP TRANSISTORS ARE 2SA937-Q or 2SA1115-E
ALL NPN TRANSISTORS ARE 2SC2021-Q or 2SC2603-E


TR5
TR8
TR10
D1
C1
R1
6CR1
R14
R15
R20
TR11
C16
R25
TR1
R3
R2
R16
TR6
R18
IC1
TR9
R22
C20
R23
TR13
R24
R4
R17
TR7
C10
TR12
D8
D7
C2
C3
D5V
P5V
D GND
C GND
+15V
-15V
RST
REF
A GND
TR2
R30
R28
R27
C15
R5
R26
R6
F3
AC 5V
TR4
C11
D2
R7
C12
D6
C17
C18
D3
C19
F2
AC 15V
R8
C7
C14
C4
R10
R9
IC2
D5
R11
C5
D4
C6
R12
R13
VR1
C13
F1
AC 15V
052H 409 A

POWER SUPPLY BOARD

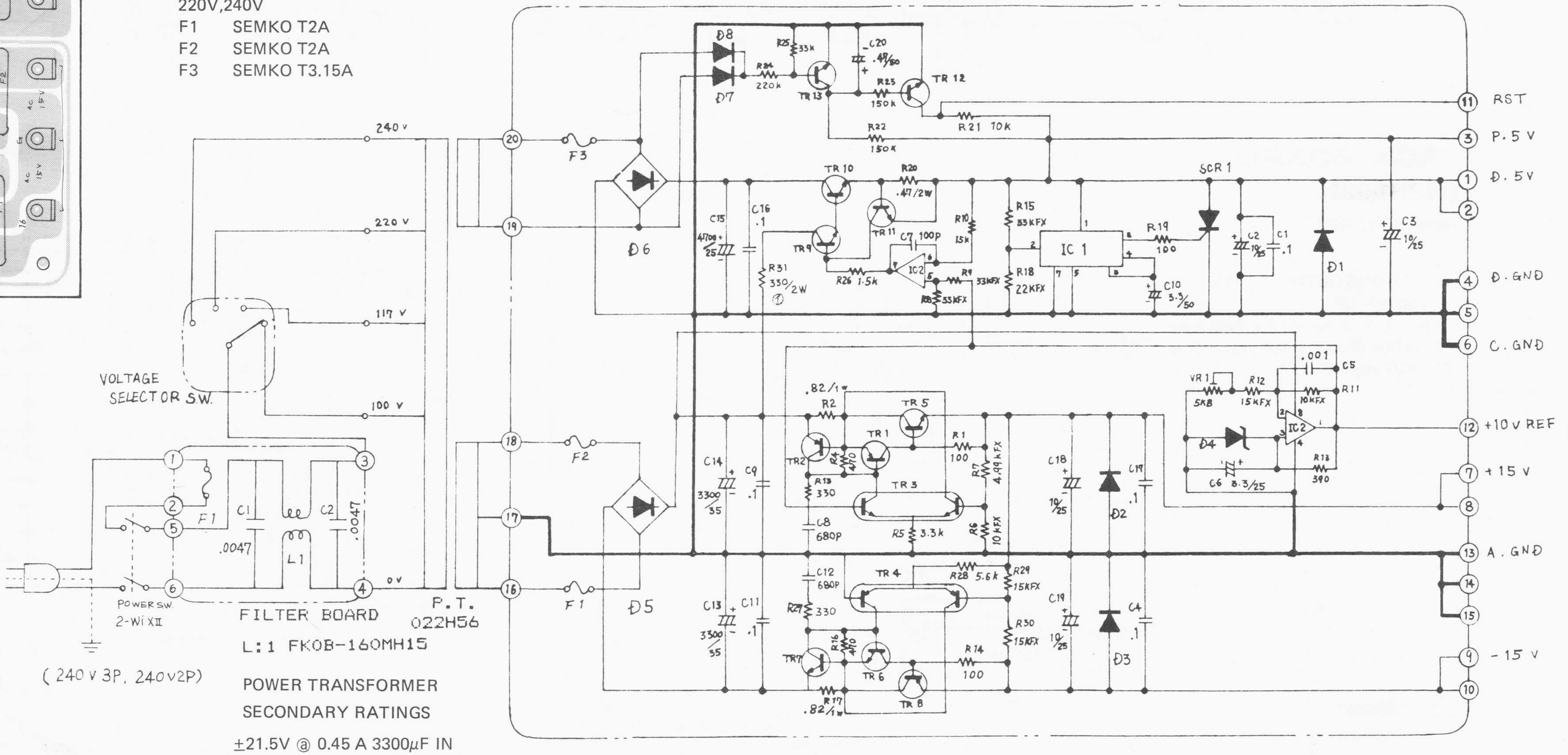
(162H061A) 100/117V

(162H062A) 220/240V

(pcb 052H409A)

100V,117V
F1 T-GGS2 (CSA) 2A
F2 T-GGS2 (CSA) 2A
F3 T-GGS3.15 (CSA) 3.15A

220V,240V
F1 SEMKO T2A
F2 SEMKO T2A
F3 SEMKO T3.15A


240 V
220 V
117 V
100 V
0 V
VOLTAGE SELECTOR SW.
POWER SW. 2-WIXII
FILTER BOARD
L:1 FKOB-160MH15
P.T. 022H56
(240 V 3P, 240 V2P)
F1
C1
C2
L1
.0047
.0047
F1
F2
F3
D5
D6
D8
D7
R25 33k
R24 220k
TR13
C20 .47/50
R23 150k
TR 12
R22 150K
R21 10K
TR 10
R20 .47/2W
R10 15k
R15 33KFX
TR11
C7 100P
TR9
IC2
R26 1.5k
R9 33KFX
R8 33KFX
R18 22KFX
R31 330/2W
C15 4700 25
C16 .1
IC 1
R19 100
C10 3.3/50
SCR 1
C2 10/25
C1 .1
D1
C3 10/25
RST
P.5 V
D.5 V
D.GND
C.GND
.001 C5
VR1 5KB
R12 15KFX
R11 10KFX
D4
C6 3.3/25
R13 390
+10 V REF
+15 V
A.GND
-15 V
.82/1W R2
TR 5
TR 1
TR2
R1 100
R4 470
R7 4.99KFX
C14 3300 35
C9 .1
R3 330
TR 3
C8 680P
R5 3.3k
R6 10KFX
C18 10/25
D2
C19 .1
C12 680P
TR 4
R28 5.6k
R29 15KFX
C13 3300 35
C11 .1
R27 330
R30 15KFX
C19 10/25
D3
C4 .1
R16 470
TR7
TR 6
R14 100
TR 8
R17 .82/1W

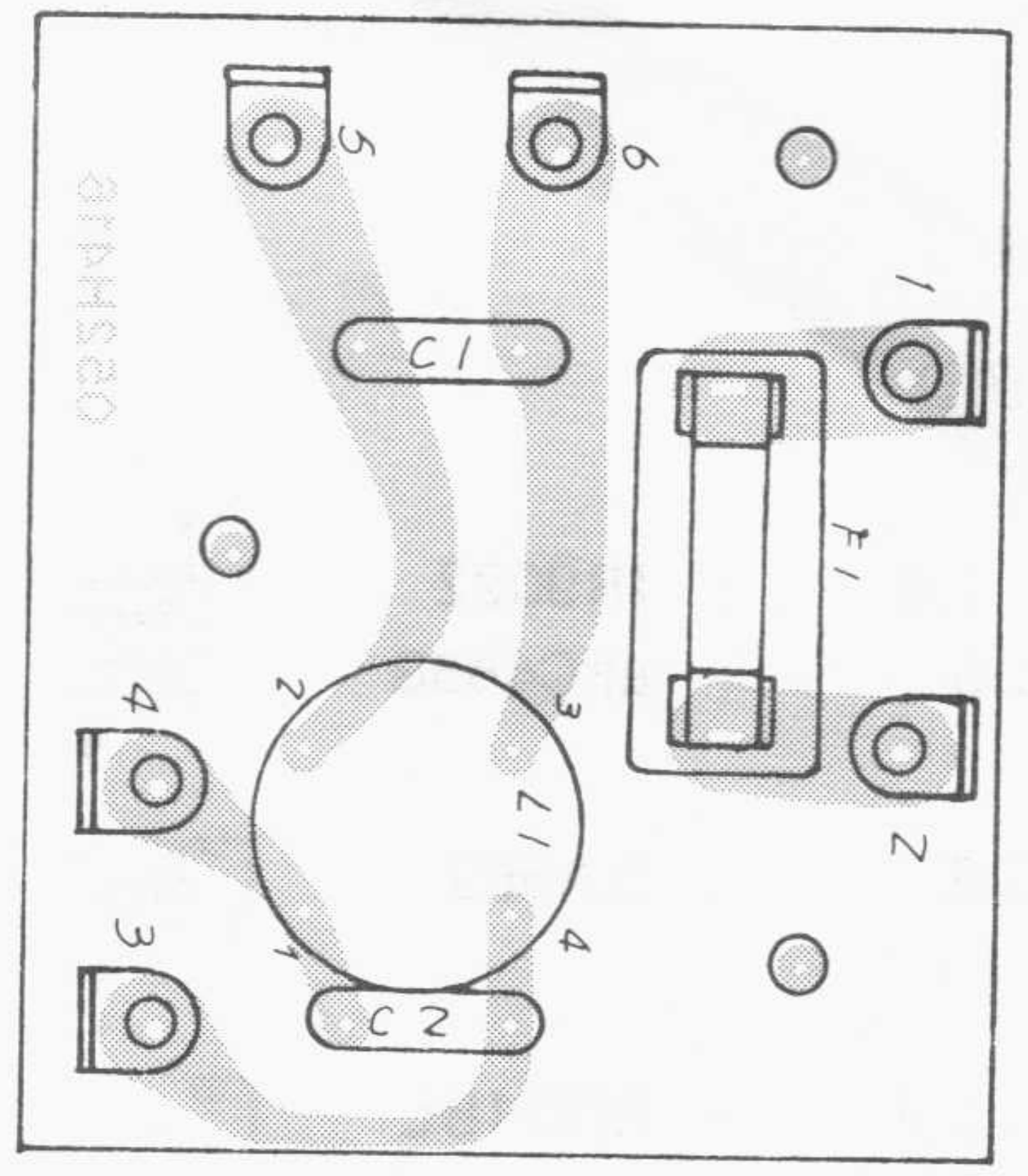
POWER TRANSFORMER
SECONDARY RATINGS
±21.5V @ 0.45 A 3300μF IN
8.5V @ 0.7 A 4700μF IN

FILTER BOARD

(149H191) 100/117V

(149H192) 220/240V

(pcb 052H416)


5
6
C1
F1
4
2
3
1
2
C2
052H416

100V,117V
F1 T-GGS1 (CSA) 1A

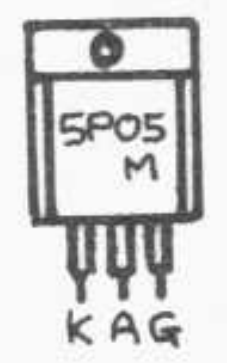
220V,240V
F1 SEMKO T3.15mA

Document scanning and editing by
Larry Hendry - www.wiseguysynth.com

IC 1 : μPC3423C
IC 2 : M5218L
TR 5,10 : 2SD1406
TR 8 : 2SB1015
TR 3 : 2SC1583
TR 4 : 2SA798

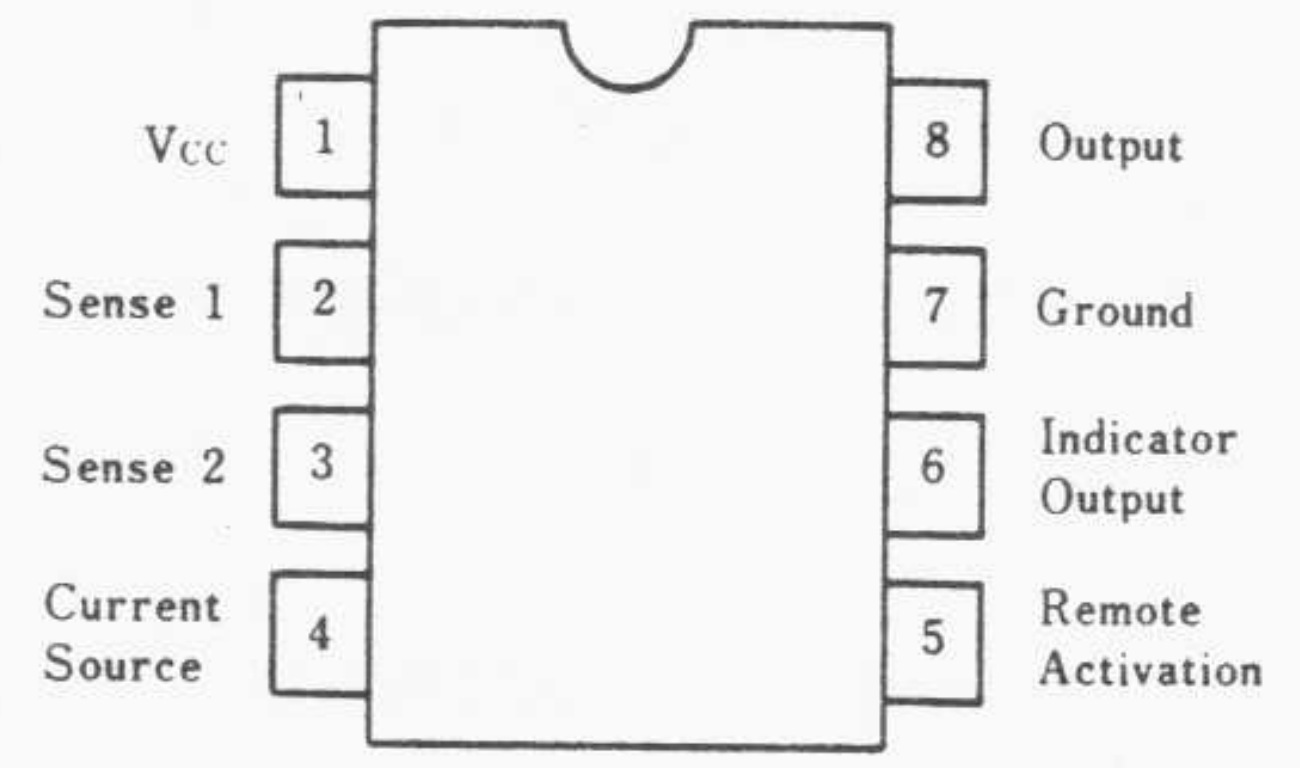
UNLESS OTHERWISE SPECIFIED
ALL NPN TRANSISTORS ARE 2SC2021-Q or 2SC2603-E
ALL PNP TRANSISTORS ARE 2SA937-Q or 2SA1115-E

SCR 1 : 5P05M
D 4 : 1SZ59
D 5, 6 : 2B4B41
D 1, 2, 3 : Hi–Fi SPECIAL
D 7, 8 : 1S2473



μPC3423C

Pin Configuration


Vcc 1
Sense 1 2
Sense 2 3
Current Source 4
8 Output
7 Ground
6 Indicator Output
5 Remote Activation

MAINTENANCE AND ADJUSTMENT

Reading through "PROGRAM FUNCTION" and "WHAT ADJUSTED" in MODULE BOARD ADJUSTMENT section and "MODULE CONTROL VOLTAGES" in the Circuit Description will help in understanding the JP-6 performance, in troubleshooting as well as in understanding adjustment theory. In maintaining the JP-6 observe the following cautions.

CAUTIONS:

When the JP-6 program cannot proceed orderly or overruns intermittently, first check the power line for excessive fluctuation, loose contact or external pulses.

When Patch Memories are volatile, check power-backup circuitry (CPU board—diodes D1 and D2 and the battery).

NOTE: Nominal battery voltage ...... 3V.
Minimum backup voltage .... 2V.
Battery voltage must be more than 2.6V.

IC24 RAM SHOULD BE TC5517APL or MB8416-25LP (low current consumption) for the longer battery life expectancy.

When the program can not escape the TAPE modes, see Panel Board R Circuit diagram for modification.

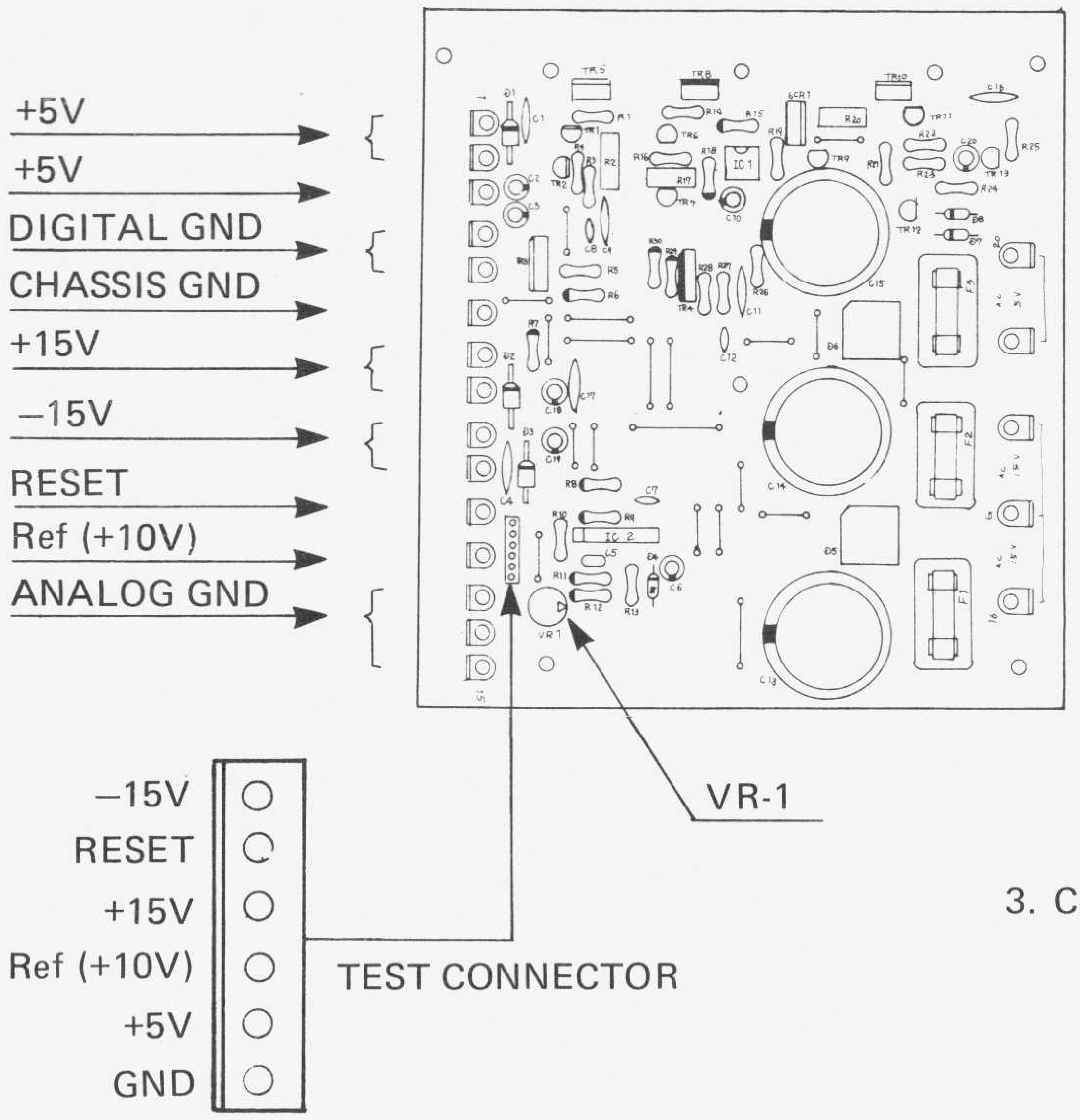
Saving the Patch memories on tape before starting troubleshooting is recommended to prevent the possible volatilization.

ADJUSTMENT

Check and readjust DC supply (as necessary) before starting particular adjustment.

POWER SUPPLY BOARD

1. Connect the digital voltmeter to Ref (+10V) terminal.
2. Adjust VR-1 for +10.00V.



The JP-6 contains the adjustment program to provide specific parameters for individual adjustment which can be evoked through BANK and NUMBER buttons when the JP-6 is in the TEST mode. To put the unit into the TEST mode, first turn the power ON, then place SW-1 (DIP SW) of the CPU board at JIG position.

CAUTION:

* Setting SW-1 before power up does not turn the JP-6 to the TEST mode.

MODULE BOARD

Refer to ADJUSTMENT LOCATIONS at the end of this section for the locations of TEST POINTs and TRIMMERs.

CAUTION:

* Adjustment Order:
Each of the following two groups is considered as an adjustment unit (set) and must be conducted in the order numbered.

A1 and A2 A4, A5 and A6

Other adjustments are independent of each other.
Be sure to turn SW-1 off after completion of the adjustment(s).

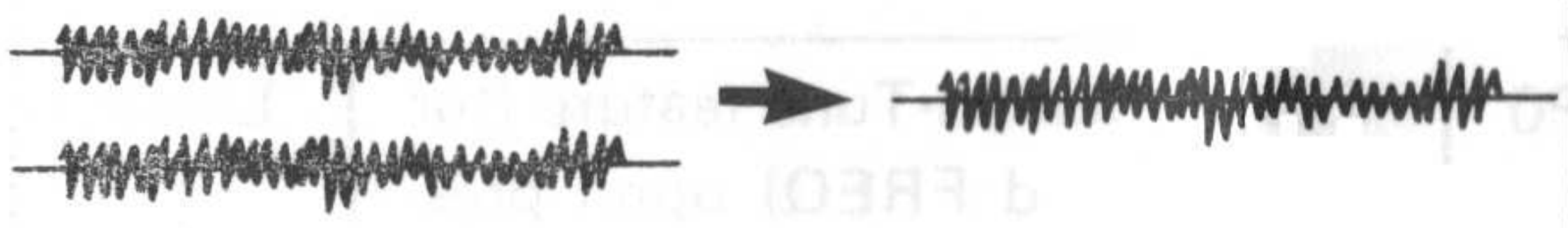
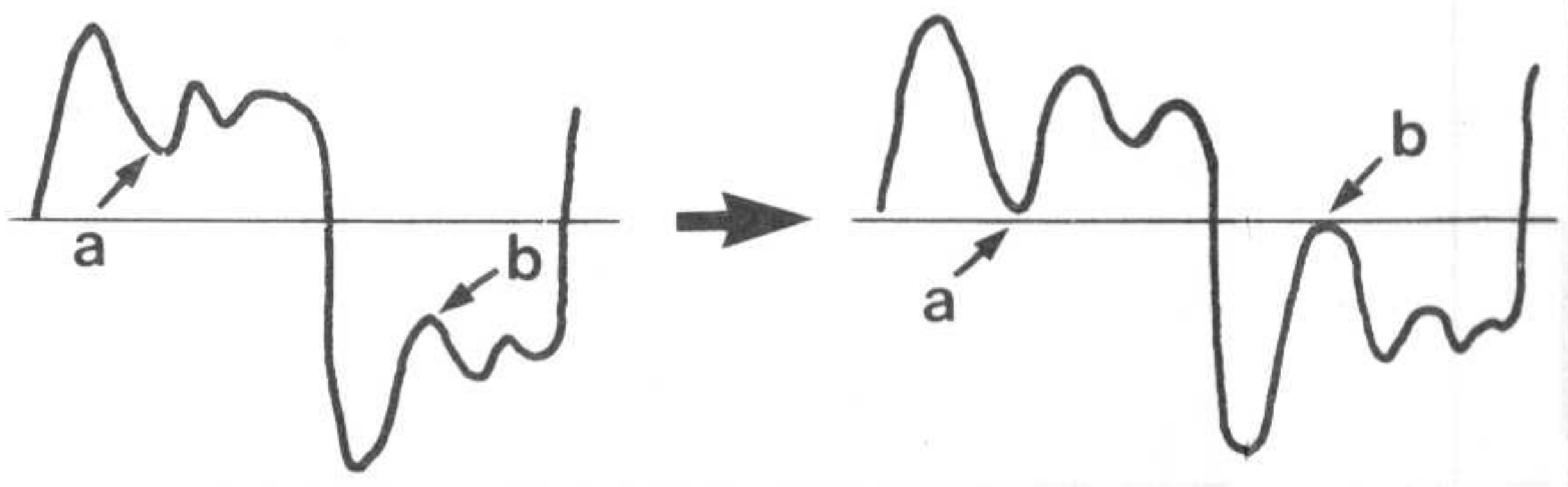
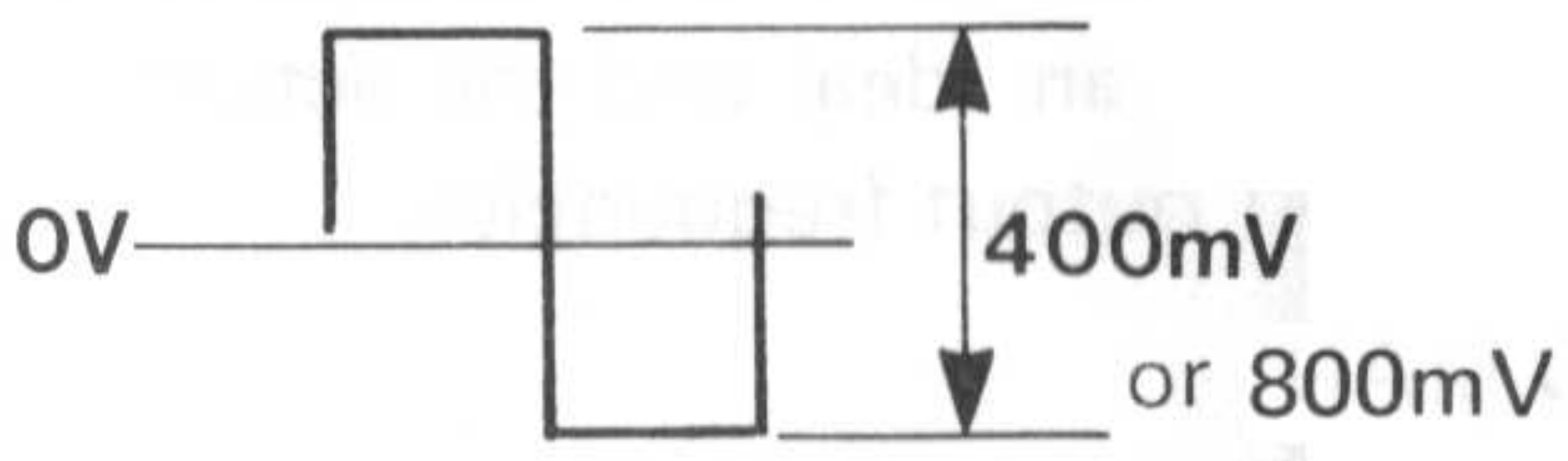
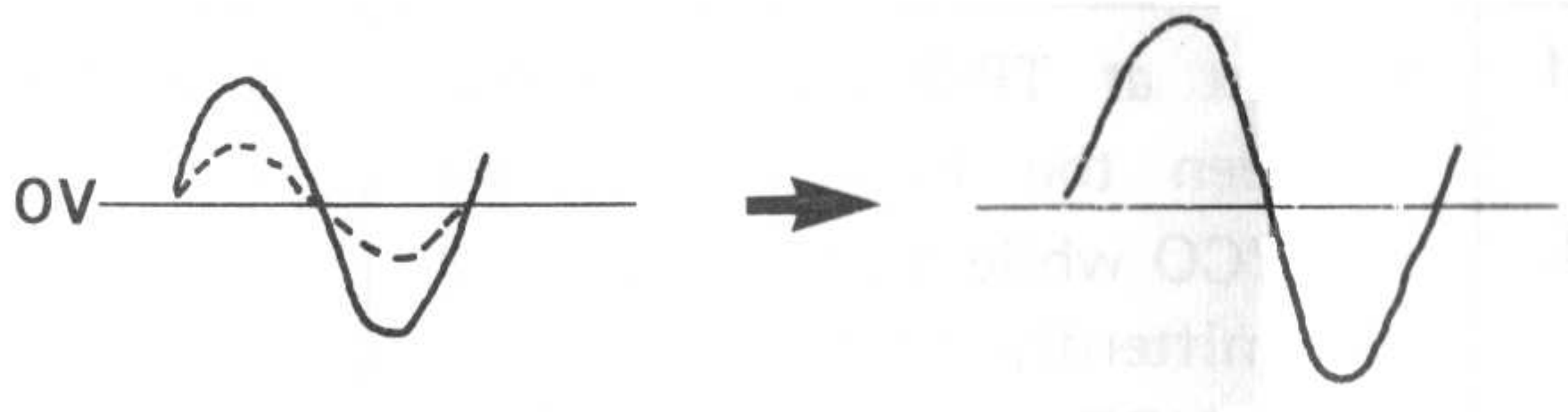
COMMON SETTINGS TO ALL THE FOLLOWING ADJUSTMENTS

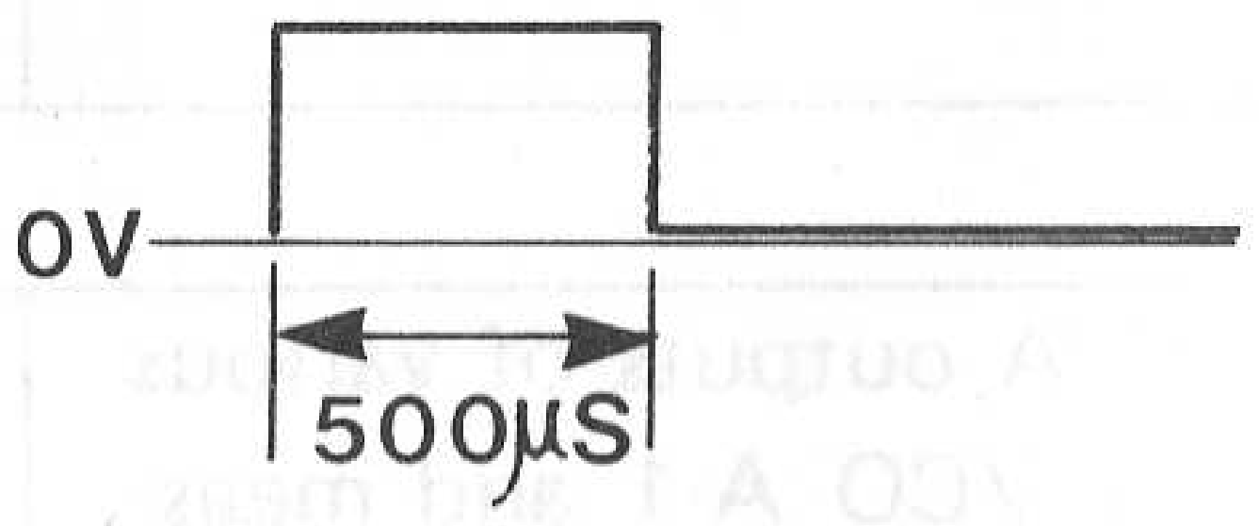
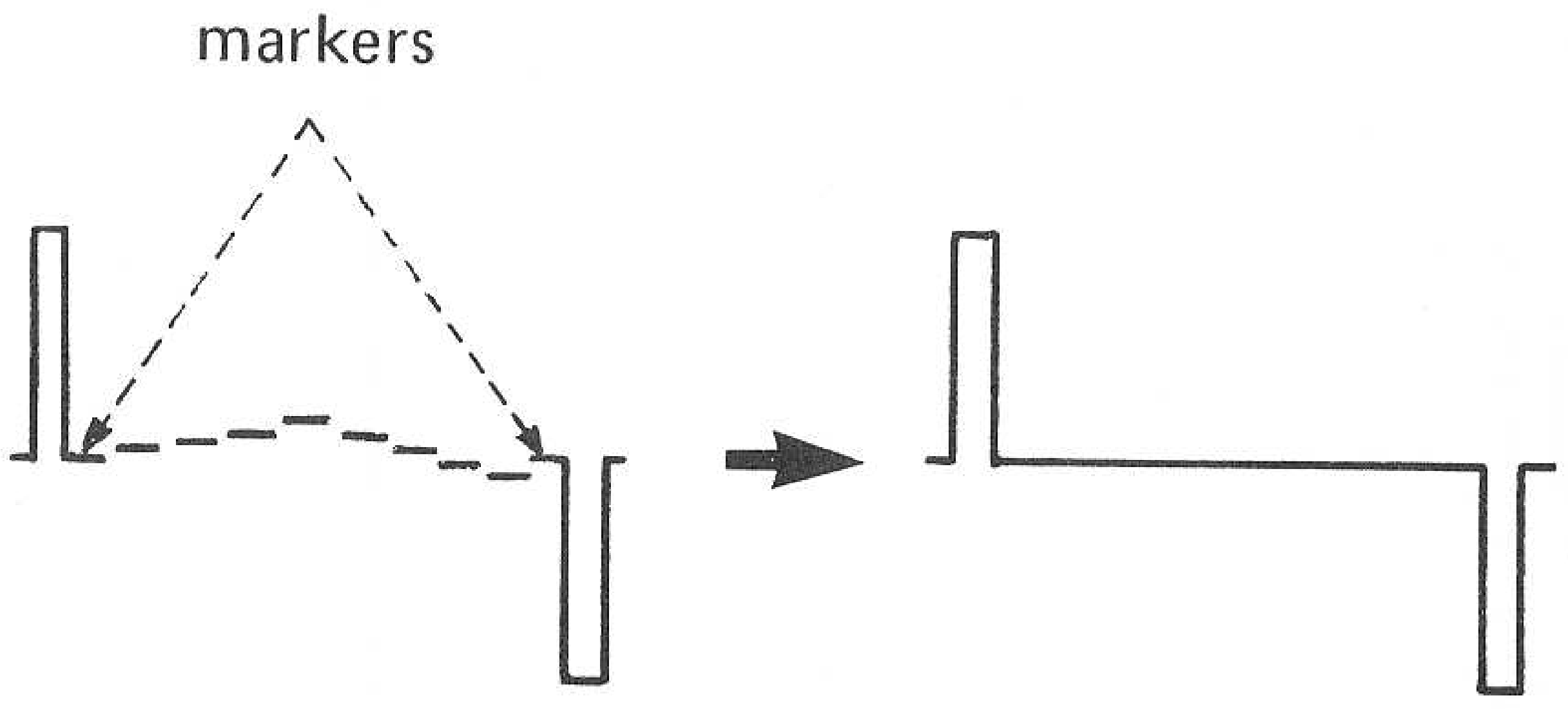
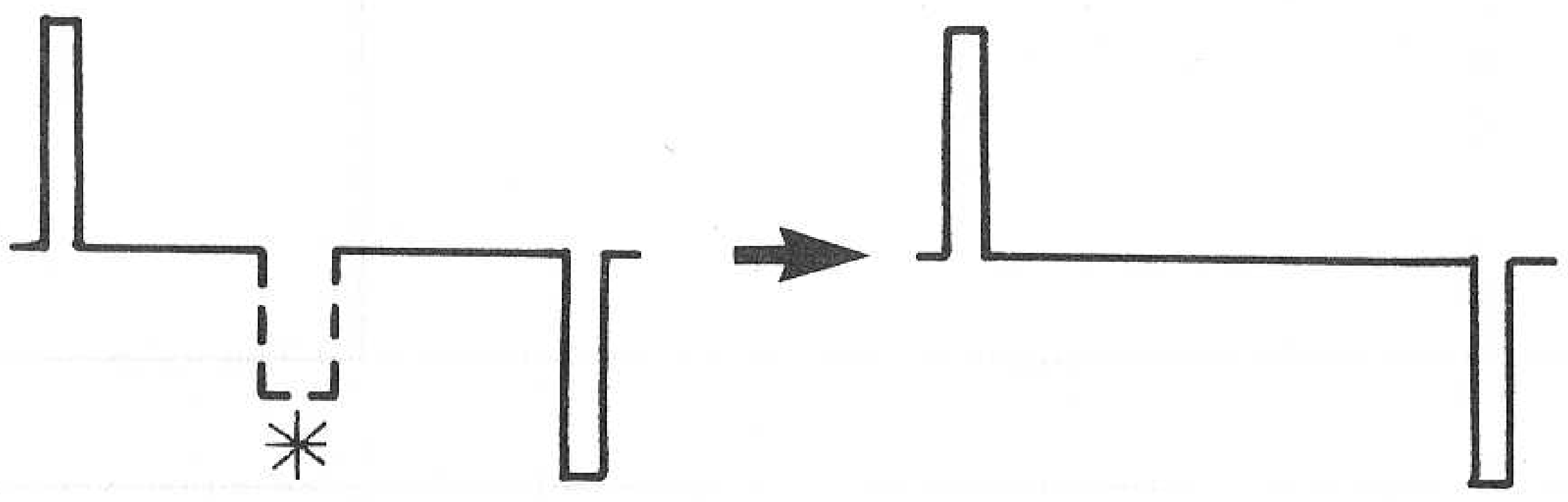
VOLUME: 10
OUTPUT LEVEL (Rear Panel): H
KEY MODE: SPLIT-1 or SPLIT-2
PANEL MODE: LOWER-4 Voice MODULE BOARD
or UPPER-2 Voice MODULE BOARD
BANK and NUMBER: As stated in an adjustment.
OSCILLOSCOPE: SLOPE (TRIGGER) "+",
(otherwise stated) PROBE 1 : 1

Example: LINEARITY
Press SPLIT-1 or SPLIT-2. Press UPPER. Press BANK D and NUMBER (example 1 = VCO A1 of 2 VOICE MODULE). If successively adjust 4 VOICE MODULE, press LOWER. LEDs D and 1 change to A-1. Press D and a NUMBER again.

3. Confirm the remaining terminal voltages. They must be:

+5V ± 30mV
+15V ± 100mV
−15V ± 400mV

PANEL SETTINGS	ADJUST	PROGRAM FUNCTION	WHAT ADJUSTED/
1. D/A **1-1. OFFSET**			
PANEL MODE UPPER (2 VOICE) LOWER (4 VOICE) BANK/NUMBER A-1	1. Connect digital voltmeter between TP-1 and TP-0 (GND) (on MOD PCB). 2. Adjust VR1 (D/A OFFSET) for 0V ± 0.1mV. TP-	Set the input bits to the D/A Converter (IC11 of the CPU Board) to 0.	The offset of the operational amplifier (IC12).
1-2. Checking D/A converter			
UPPER (2 VOICE) LOWER (4 VOICE) BANK/NUMBER A-2	After setting BANK/NUMBER, see if TUNE LED of the panel goes out within 2-3 seconds. If not, repeat steps in 1-1, (adjust D/A OFFSET VR1).	Connect D/A outputs of various voltages to VCO A-1 and measure its corresponding output sequences.	If the TUNE LED remains lit for more than several seconds, check D/A, VCO A-1 and A-2.
2. DC BAL			
PANEL MODE UPPER (2 VOICE) LOWER (4 VOICE) BANK/NUMBER A-3 OSCILLOSCOPE H: 0.1ms/cm V: 5mv/cm AC Coupling	1. Connect the scope to OUTPUT JACK or R21 (JACK BOARD). 2. Adjust VR10 (DC BAL) for the minimized DC drift. Increase scope sensitivity as necessary. 	Apply LFO output (square, between 0V and +10V) to the final VCA IC53.	The offset of the VCA.
3. RESONANCE			
PANEL MODE UPPER (2 VOICE) LOWER (4 VOICE) BANK/NUMBER A-4 (VR9AB) A-5 (VR9CD) OSCILLOSCOPE H: 0.1ms/cm V: 200mV/cm AC Coupling	1. Connect the scope to OUTPUT JACK or R21 (JACK BOARD). 2. Adjust VR9 (RESO) so that a and b in Fig. 2 are positioned to the 0V line.  	Apply VCO output, together with RESONANCE and CUTOFF data, to two VCFs.	Amount of feedback for a proper regeneration.
4. OUTPUT LEVEL			
PANEL MODE UPPER (2VOICE) LOWER (4 VOICE) BANK/NUMBER A-6	1. Connect the scope to OUTPUT JACK. 2. Adjust VR-11 (LEVEL) for 400mVp-p (SN up to 280949) or 800mVp-p (SN 290950-up) as shown below.  	Apply the predetermined control voltages and input signal to the final VCA IC53.	See JACK BOARD diagram for change information.
5. CUTOFF			
PANEL MODE UPPER (2 VOICE) LOWER (4 VOICE) BANK/NUMBER B-1 (A) B-2 (B) B-3 (C) B-4 (D) OSCILLOSCOPE H: 0.1ms/cm V: 500mV/cm AC Coupling	1. Connect the scope to OUTPUT JACK or R21 (JACK BOARD). 2. Adjust VR8 (CUTOFF or FREQ) for the maximum amplification.  	Feed square wave (of a predetermined frequency and level) from a VCO to the VCF while set the VCF to full resonance.	Tune the resonance frequency to that of the VCO.

PANEL SETTINGS	ADJUST	PROGRAM FUNCTION	WHAT ADJUSTED/ DESCRIPTION
6. PW PANEL MODE UPPER (2 VOICE) LOWER (4 VOICE) BANK/NUMBER **C-1 (VR4A)** **C-2 (VR6A)** **C-3 (VR4B)** **C-4 (VR6B)** **C-5 (VR4C)** **C-6 (VR6C)** **C-7 (VR4D)** **C-8 (VR6D)** OSCILLOSCOPE TRIG: MANUAL H: 0.1ms/cm V: 500mV/cm AC Coupling	1. Connect the scope to OUTPUT JACK or R21 (JACK BOARD). 2. Adjust VR4 (VR6) (PW) for the 500µs pulse length. 	Apply predetermined control voltages (frequency, PW) to the VCO.	Pulse width to the specified duty ratio.
7. LINEARITY			
PANEL MODE UPPER (2 VOICE) LOWER (4 VOICE) BANK/NUMBER **D-1 (VR3A)** **D-2 (VR5A)** **D-3 (VR3B)** **D-4 (VR5B)** **D-5 (VR3C)** **D-6 (VR5C)** **D-7 (VR3D)** **D-8 (VR5D)** OSCILLOSCOPE H: 0.1ms/cm V: 500mV/cm AC Coupling	1. Connect the scope between TP-3 and TP0 (GND). 2. Adjust VR3 (VR5 LINEARITY) for straightness by aligning signals to the markers. Increase V sensitivity for fine adjustment. Press the BANK/NUMBER button again when the detune is too great for adjustment. 	Enable Compu-Tune feature (for WIDTH and FREQ) upon pressing BANK/NUMBER, then apply control voltages to the VCO in 8 steps. Measuring the result frequency, present detune data at TP-3.	Linearity of VCO.
8. X MOD			
PANEL MODE UPPER (2 VOICE) LOWER (4 VOICE) BANK/NUMBER **E-1 (VR7A)** **E-2 (VR7B)** **E-3 (VR7C)** **E-4 (VR7D)** OSCILLOSCOPE H: 0.1ms/cm V: 500mV/cm AC Coupling	1. Connect the scope between TP-3 and TP0 (GND) of MOD BOARD. 2. Adjust VR7 (X MOD) for flattening the part (*) as shown in Fig. 7.  Note: The part can be a positive going pulse.	Synchronize the VCO-2 with the VCO-1, then apply the VCO-2 output (amount equal to that when CROSS MOD MANUAL is 5) to the VCO-1. Present at TP-3 the difference between an ideal and the actual VCO-1 output frequencies.	Prevention of unfavorable modulation signals.

BENDER BOARD

1.			
BANK/NUMBER **F-1 (VR1)** **F-2 (VR2)** OSCILLOSCPE H: 0.1ms/cm V: 500mV/cm AC Coupling	1. Connect the scope between TP-3 and TP-0 of either MOD BOARD. 2. Adjust VR1 (VR2) in the same manner as in 8. X MOD. The BENDER lever must be at the neutral position.	Present at TP-3 the difference between the frequencies from the VCO while placing a ground intermittently to the BEND IN of the VCO.	BENDER output to 0.

NOTE: Designations for extention-lines VRs and TPs shown below are applicable to all PCB revisions. Some PCBs have wrong designation(s).

OUTPUT LEVEL
VR11
DC BAL
VR10
XMOD
VR7
PW
VR6
PW
VR4
RESONANCE
VR9 AB
VR9 CD
CUTOFF
VR8
D/A
OFFSET
VR1
TP-1
TP-0
TP-2
TP-0
TP-3
LINEARITY
VR5
LINEARITY
VR3
JP-6 MODULE BOARD
052H403B
VCO POWER SUPPLY
SLAVE CPU

PARTS LIST

CHASSIS

061H147D	Chassis H147D
063H057	Side panel H57 (right)
063H058	Side panel H58 (left)
063H061	Plate H61 (Power transformer)
063H056A	Voltage selector plate H56A
061H149	Chassis H149 (JACK BOARD)

PANEL

072H142A	Top panel H142A
072H141	End block H140 (right)
072H140	End block H141 (left)

HOLDER

064H177B	Holder H177B	(Chassis H147D) behind KBD
064H176	Holder H176	(Heat sink H33A)
064H092	Holder H92	(BENDER BOARD)
064H124	Holder H124	(BENDER BOARD)

COVER

065H135	Cover H135	(Top panel H142)
065H127B	Cover H127B	(Chassis H147D front)
065H126	Cover H126	(Slide Pot mask)
065H132	Cover H132	(BENDER BOARD slide Pot mask)
065H065	Cover H65	(Slide switch mask)

KNOB, BUTTON

016H098	Knob H98	(slider)
016H106	Knob H106	(rotary, BENDER BOARD)
016H102	Knob H102	(rotary, PANEL BOARD)
016H095	Button H95	(for SPQ009F)
016H085	Button H85	(White)
016H086	Button H86	(Purple)
016H087	Button H87	(Light blue)
016H088	Button H88	(Dark blue)
016H036	Button H36	(BENDER BOARD)

AC CORD SET

053H218	DC-320-J01	100V
053H219	UC-704-J01	117V 2P
053H220	EC-210-J06	220V 2P
053H221	EC-702-J05	240V 2P
053H222	SC-415-J06	240V 3P

SWITCH

13169503	ESE-3711	(VOLTAGE SELECTOR)
13149109	2wi XII	[POWER SWITCH (UL mark)]
13159322	HSW0372-01-520	(slide switch)
13129327	SPQ009F	(key switch)
13129717	KEH10003	(key switch, LFO-2)
13129531	SUT32A-1	(push switch, BEND)
13159138	SSS212B	(DIP)

JACK

13449125	HLJ0520-01-110	
13449126	HLJ0520-01-010	
13449226	HLJ4305-01-030	

SOCKET

13429615	TCS5350-01-1111	(DIN)
13429710	PA-126	(AC inlet 100V, 117V, 220V)
13429708	CM-3	(AC inlet 240V)
13439851	HA16R-3P	(XLR)
13429511	IC-49-2406 #2	(24P)

CONNECTOR

13439119	5045-03A	
13439120	5045-04A	
13439122	5045-06A	
13439123	5045-07A	
13438124	5045-08A	
13439126	5045-10A	
13439127	5045-11A	
13439130	5046-03A	
13439131	5046-04A	
13439132	5046-05A	

TRANSFORMER

022H056A	100V, 117V, 220V, 240V	(Power)
12449229	DP-101	(Matching)

FILTER

13529105	DSS310-55D223S	(Bypass capacitor)
12449229	FKOB-160MH15	(Coil)

DIODE

15019629	05Z6.2X	(zener)
15019617	05Z11X	(zener)
15019639	1SZ59	(zener)
15219403	5P05M(50V) or 5P4M(400V)	(SCR)
15019254	2B4B41	(bridge rectifier)
15019247	GP-30G	(Hi-Fi Special)
15019103	1S2473	
15029150	GL-9PR12	(LED, red, package white)
15029149	GL-9PG12	(LED, green, package white)
15029151	GL-9HY12	(LED, yellow, package white)
15029152	GL-9HD12	(LED, red, package white)
10529148	GL-9ND2	(LED, red/YG, package white)
15029147	GL-9HD2	(LED, red, high intensity package orange)
15029161	GL-9HD51A	
15029160	GL-9HD51 B or C	
15029162	BR5557K	(LED, red, high intensity package red all equivalent)
15019116	ARRAY DAP-601	

FUSE

12559335	T-GGS1 (CSA)	1A	Prim. 100V, 117V
12559510	SEMKO T315mA		Prim. 220V, 240V
12559514	SEMKO T2A		sec. 220V, 240V
12559336	T-GGS2 (CSA)	2A	sec. 100V, 117V
12559337	T-GGS3 (CSA)	3A	sec. 100V, 117V
12559338	T-GGS3.15 (CSA)	3.15A	sec. 100V, 117V
12559516	SEMKO	T3.15A	sec. 220V, 240V

PCB

Order for PCB replacement will usually be filled with a newer one as long as they are compatible (if not, may be accompanied by adapting guide).

149H179C	CPU BOARD	(pcb 052H402C)
149H180B	MODULE BOARD (4-VOICE)	(pcb 052H403B)
149H181B	MODULE BOARD (2-VOICE)	(pcb 052H403B)
149H182A	BENDER BOARD	(pcb 052H404A)
149H183A	PANEL (L) BOARD	(pcb 052H405A)
149H184C	PANEL (R) BOARD	(pcb 052H406C)
149H186C	JACK BOARD	(pcb 052H408C)
162H061A	POWER SUPPLY BOARD (100V, 117V)	(pcb 052H409A)
162H062A	POWER SUPPLY BOARD (220V, 240V)	(pcb 052H409A)
149H191	FILTER BOARD (100V, 117V)	(pcb 052H416)
149H192	FILTER BOARD (220V, 240V)	(pcb 052H416)

POTENTIOMETER

	SLIDER	
13339420	S3018P405-B15	100KB
	ROTARY	
13219126	EVH-5XAP15-B15	100KB
13219125	EVH-5XAP15-B14	10KB
	TRIMMER	
13299563	RVG0707V101-10-103M	10K
13299564	RVG0707V101-10-104M	100K
13299562	RVG0707V101-10-503M	50K
13299525	3321P-1-502	5K

TRANSISTOR

15119108	2SA798-G
15119121	2SA937-Q or
	2SA1115-E (15119129)
15119814	2SB1015-O
151291300G	2SC1583-G
15129119	2SC2021-Q or
	2SC2603-E (15129140)
15129136	2SC2878-A
151291080A	2SC945 (NZ Selected)
15129827	2SD1406-O

CAPACITOR

13529103	DD111CH221J50J	220PF
13529102	DD600-257BC104Z12	0.1μF
13529104	DE7150F472MVA1 (Line bypass capacitor)	

IC

15179318	P8051-318-0	CPU	CPU BOARD
15179319	P8051-319-0	CPU	MODULE BOARD
15179142	P8031 or P8051	CPU	

P8031 and P8051 without suffix number (-318 or -319)
Both have no internal program and need external PROM.
Common to CPU and MODULE BOARD.

P8051-318, P8051-319
Contains program to make external PROM unnecessary.
NOTE: Internal/External ROMs can be switched by EA terminal of CPU. See Circuit Diagram.

15159702	M54563P	8-Unit 500mA Source type darlinton transistor
15189136	M5218L	Dual low noise op amp
15199117	M5230L	Variable output voltage regulator
15159701	M54522P	8-Unit 400mA Darlington transistor array
15189155	M51201L	Voltage comparator
15169304	74LS04	Hex inverter
15169352	74LS40	Dual 4-input positive NAND buffer
15169353	74LS145	BCD-to-Decimal decoder/driver
15159503	TC40H000P	Quad 2-input NAND gate
15159504	TC40H002P	Quad 2-input NOR gate
15159506	TC40H138P	3-to-8-line decoder/demultiplexer
15159524	TC40H245P	Octal bus transceiver
15159507	TC40H273P	Octal D-type filp-flop
15159131	TC4053BP	Triple 2-channel multiplexer/demultiplexer
15159134	TC4028BP	BCD to decimal (binary to octal) decoder
15179317	TC5517APL or MB8416-25LP	RAM
15179316	TC5517AP or MB8416-25P	RAM

Use only "L" type for IC24 (CPU BOARD) for the longer battery life.

15189146	IR9022	Low power dual op amp
15229801	IR3109	VCF
15219130	ADC0803LCN	A/D Convertor
15179620	2732A-A	PROM A CPU BOARD

Unnecessary when CPU is P8051-318

15179621	2732A-B	PROM B MODULE BOARD
15159508	TC40H373P	Octal D-type latch (3-state output)

Unnecessary when CPU is P8051-319.

15189117	TL081C	OP AMP
15189118	TL082CP	OP AMP
15189154	TL064CP	Low power op amp
15159113	HD14051BP	8-Channel analog multiplexer/demultiplexer
15159313	MC14551B	Quad 2-input analog multiplexer/demultiplexer
15159311	MC14504B	HEX level shifter
15219127	ITS80141	D/A Converter
15229810	CEM3340	VCO
15219129	CEM3360	VCA
15219124	µPC1252H2	VCA selected (white)
15199119	µPC3423C	Overvoltage protector
15219131	HA17903PS	Dual comparators
15229802	BA662-A	VCA
15229812	EHM-S226W83S	Hybrid amp
15159136	CD4067B	Single 16-Channel multiplexer/demultiplexer

PHOTO COUPLER

15229712	PC-900

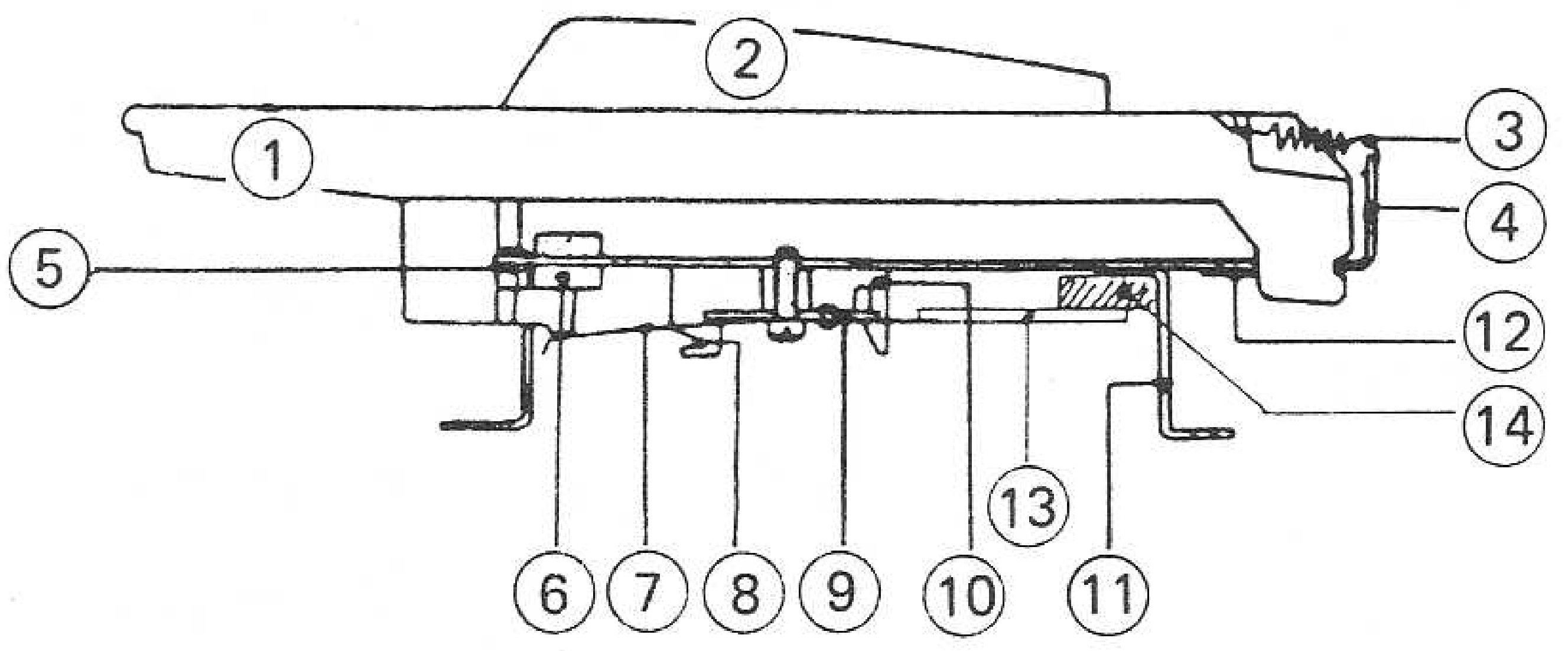
RESISTOR

	CRB25FX (1%)
13769162D0	3.6K
13769263D0	4.99K
13769173D0	10K
13769177D0	15K
13769178D0	16K
13769180D0	20K
13769181D0	22K
13769185D0	33K
13769188D0	43K
13769191D0	56K
13769197D0	100K
13769200D0	130K
13769264D0	140K
13769201D0	150K
13769203D0	180K
13769205D0	220K
13769213D0	470K
13769221D0	1M
	KNY2W
13859106	(0.47Ω)
13859107	(0.82Ω)
	POSISTOR
15229910	ERS-B33G122

	ARRAY		
13919304	RM4-105J	1M	x 4
13910106	RM6-103K	10K	x 6
13919302	RM8-102J	1K	x 8
13919301	RM8-472J	4R7K	x 8
13829821	RM8-103K	10K	x 8
13919303	RM8-333J	33K	x 8
13919122	EXQ-D08E270J	27	x 8
13919317	EXQ-D08E680J	68	x 8
13919318	EXQ-D08E682J	6.8K	x 8
13919131	RM0889		
13919128	RM0688		
13919132	RM0891		
13919129	RM0689		
13919130	RM0690		

KEYBOARD

004H008	SK-361C	(61 keys)



KEYBOARD PARTS
SK-361C (004H008)

NO	PART NO	DESCRIPTION
1	106H026	Natural key C F
1	106H027	Natural key D
1	106H028	Natural key E B
1	106H029	Natural key G
1	106H030	Natural key A
1	106H031	Natural key C′ F′
2	106H032	Sharp key black
3	070H029	Key spring H29
4	061H086A	Chassis H86A
5	068H004	Guide bushing H4
6	101H141	Level felt H141
7	071H044	Contact leaf H44
8	071H051	Busbar 8P H51
	071H054	Busbar 5P H54
9	043H007	Switch unit 12P H7
	043H008	Switch unit 13P H8
10	104H029	Busbar holder H29
11	062H024	Chassis bracket H24
12	098H006	Key stopper H6
13	052H283-5	Matrix board H283-5
14	107H059	Cushion H59

BENDER UNIT

2327571300	PB-6

OTHERS

068H049	LED guide H49
073H027	LED spacer H27
048H033A	Heat sink H33A
125569111	CR 1/3N (Lithium battery)
12199519	TF-758 (Fuse holder)

THE MIDI

MIDI stands for Musical Instrument Digital Interface designed to enable interconnecting synthesizers, sequencers, rhythm machines, home computers, etc. Copies of publications concerning MIDI hardware and data format will be obtained from MIDI committee or through Roland distributers.
In the following listed are data formats and data handling capabilities of MIDI system of the JP-6 and other Roland models now on the market, for reference.

NOTE: Availability of MIDI effects at slave equipment depends on its MIDI operation scheme.

JP-6 MIDI INPLEMENTATION

TRANSMITTED DATA

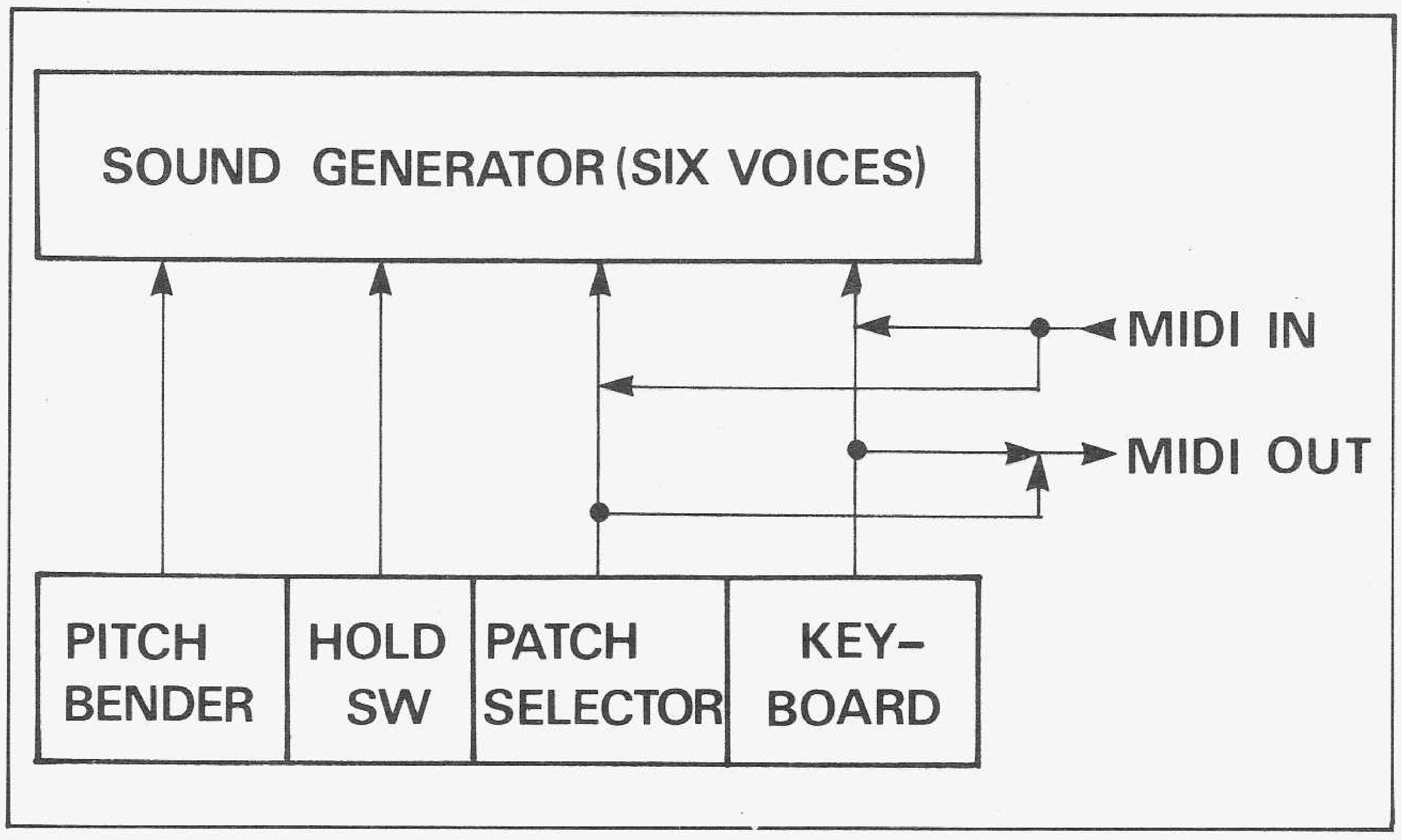
Status	Second	Third	Description
1001 000*	0kkk kkkk	0vvv vvvv	Note On (v=40H) / off (v=0)
1011 000*	127 (7FH)	0	POLY Mode Select (All notes off)
1100 0000	000p pppp		Program Change p=0 - 31 (1FH)
1111 0110			Tune

RECOGNIZED RECEIVE DATA

1001 000*	0kkk kkkk	0vvv vvvv	Note On (v > 0) / off (v=0) Velocity ignored
1000 000*	0kkk kkkk	0vvv vvvv	Note Off. Velocity ignored
1011 000*	125 - 127	0	Mode Select
1100 000*	000p pppp		Program Change
1111 110			Tune

Notes:

1. In WHOLE KEY mode, the JP-6 sends and receives on Channel 1 only. In SPLIT KEY mode, channels 1 and 2 are allocated to the upper half and the lower half of the keyboard respectively.
   In OMNI mode, any channel will be accepted.
2. The receiver accepts both OMNI and POLY Select.
   When MONO Select is received, the receiver switches to OMNI mode.
3. The key signal received from MIDI IN is mixed with self contained key signal.
4. The JP-6 accepts Program Changes not as the number of the tone program but as the number of a combination of Key Mode (WHOLE/SPLIT) and a tone Program Number.
   The receiver reads Program Changes when PATCH PRESET on the control panel is turned on.
5. The notes outside the JP-6 keyboard range will be shifted by octave(s) to fall within the range.



JX-3P MIDI INPLEMENTATION

TRANSMITTED DATA

Status	Second	Third	Description
1001 0000	0kkk kkkk	0vvv vvvv	Note On (v=40H) / (v=0)
1011 0000	0100 0000	0	Hold Off from rear panel jack, if enabled.
1011 0000	0100 0000	7FH	Hold On from rear panel jack, if enabled.
1011 0000	0111 1111	0	POLY Mode Select (All notes off)
1100 0000	00pp pppp		Program Change from front panel, if enabled. Bank A-1 (0) → Bank D-16 (63)
1110 0000	0bb0 0000	0bbb bbbb	Pitch Bender if enabled.

	MSB	LSB
MAX (high)	127	96
CENTER	64	0
MIN (low)	0	0

Notes:

1. HOLD switch on the front panel does not send the signal to MIDI OUT.
2. Pitch Range (0kkk kkkk) is 36(C0) - 96(C5).
3. The transmitter sends All Notes Off (POLY Select) when all of the keys are released.

RECOGNIZED RECEIVE DATA

Status	Second	Third	Description
1001 0000	0kkk kkkk	0vvv vvvv	Note On (v > 0) / off (v=0) Velocity ignored.
1000 0000	0kkk kkkk	0vvv vvvv	Note Off. Velocity ignored.
1011 0000	0100 0000	0	Hold Off, if enabled.
1011 0000	0100 0000	7FH	Hold On, if enabled. v=1 - 126 ignored.
1011 0000	125 (7DH)	0	OMNI Select (All notes off).
1011 0000	127 (7FH)	0	POLY Select (All notes off).
1100 0000	00pp pppp		Program Change if enabled. p=0 - 63
1110 0000	0bb0 0000	0bbb bbbb	Pitch Bender if enabled.

	MSB	LSB
MAX	127	96
CENTER	64	0
MIN	0	0

LS 5 bits ignored.

Notes:

1. The JX-3P does not respond to MONO Mode Select.
2. Internal sequencer is not connected to MIDI out.
3. In OMNI mode, any channel will be accepted.
4. Sensitivity of the Pitch Bender is selected by the receiver.

	Wide	Middle	Narrow
MAX (MSB - 127 LSB - 96)	+7	+4	+2 semitone
MIN (MSB - 0 LSB - 0)	−7	−4	−2 semitone

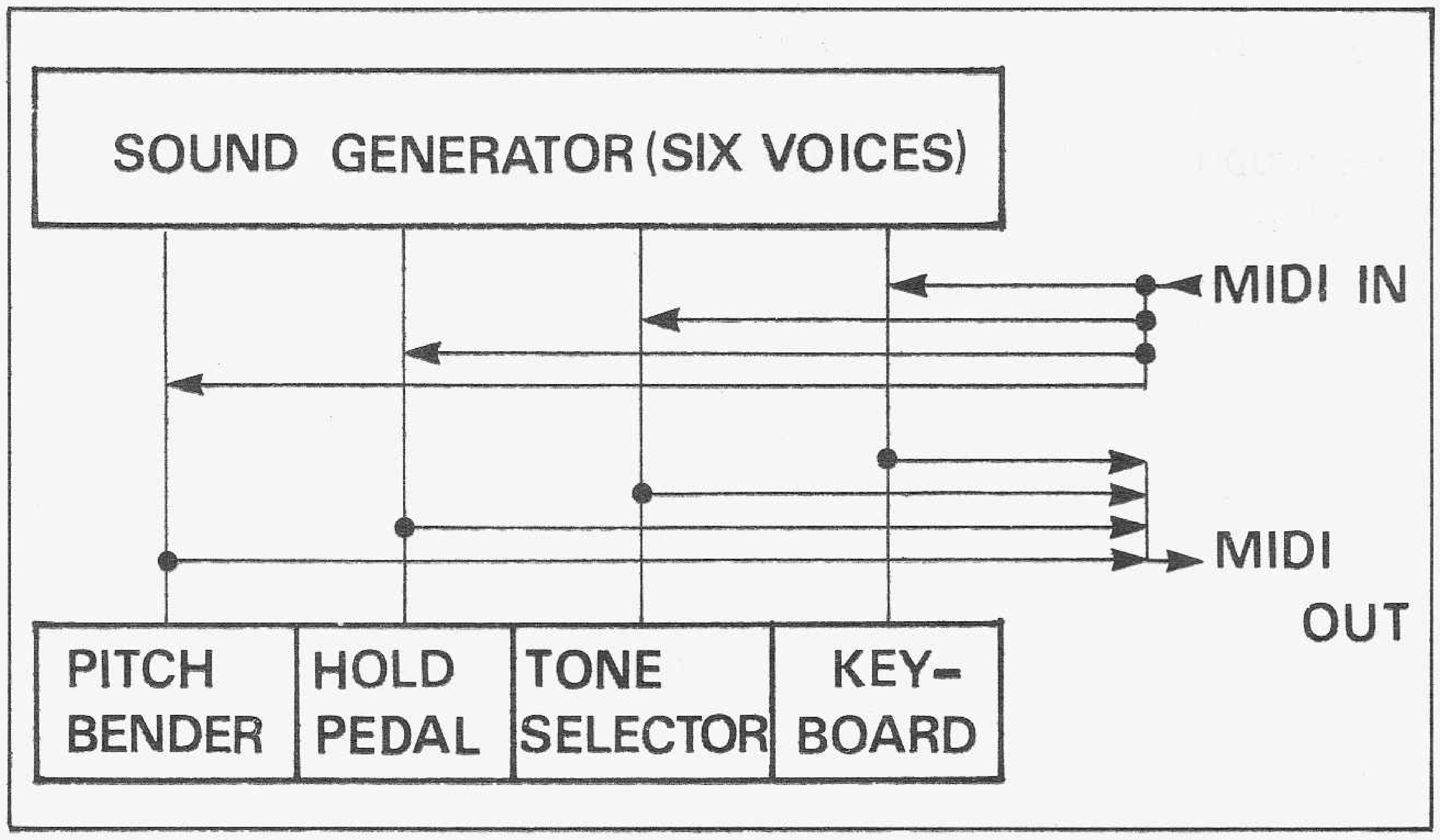
FRONT PANEL CODED FUNCTION

When power on, pressing a Program Select switch will disable the following functions.

Switch	Function
14	Hold On/Off, both transmit and receive.
15	Pitch Bender Change, both transmit and receive.
16	Program Change, both transmit and receive.

Note:

1. On power up, not pressing any switches, these MIDI functions are enabled.
2. The notes outside the JX-3P keyboard range will be shifted by octave(s) to fall within the range.


SOUND GENERATOR (SIX VOICES)
MIDI IN
MIDI OUT
PITCH BENDER
HOLD PEDAL
TONE SELECTOR
KEY-BOARD

JX-3P

HP-300⁄400 MIDI INPLEMENTATION

TRANSMITTED DATA

Status	Second	Third	Description
1001 0000	0kkk kkkk	0vvv vvvv	Note On
		0000 0000	Note Off
			kkk kkkk = 29 - 103 (HP-300)
			21 - 108 (HP-400)
			vvv vvvv = 1 - 127
1011 0000	0100 0000	0111 1111	Damper On
		0000 0000	Damper Off
1011 0000	0100 0001	0111 1111	Soft On
		0000 0000	Soft Off
1011 0000	0111 1111	0000 0000	All Notes Off
			POLY Mode Select

RECOGNIZED RECEIVE DATA IN OMNI MODE

Status	Second	Third	Description
1000 xxxx	0kkk kkkk	0vvv vvvv	Note Off
			kkk kkkk = 0 - 127
			vvv vvvv = 0 - 127
			xxxx = 0 - 15
1001 xxxx	0kkk kkkk	0vvv vvvv	Note On
		0000 0000	Note Off
			kkk kkkk = 0 - 127
			vvv vvvv = 1 - 127
1011 xxxx	0100 0000	0111 1111	Damper On
		0000 0000	Damper Off
1011 xxxx	0100 0001	0111 1111	Soft On
		0000 0000	Soft Off
1011 0000	0111 1111	0xxx xxxx	All Notes Off
			POLY Mode Select
			xxx xxxx any value
	0111 1110	0xxx xxxx	All Notes Off
			MONO Mode Select (as OMNI)
	0111 1101	0xxx xxxx	All Notes Off
			OMNI Mode Select

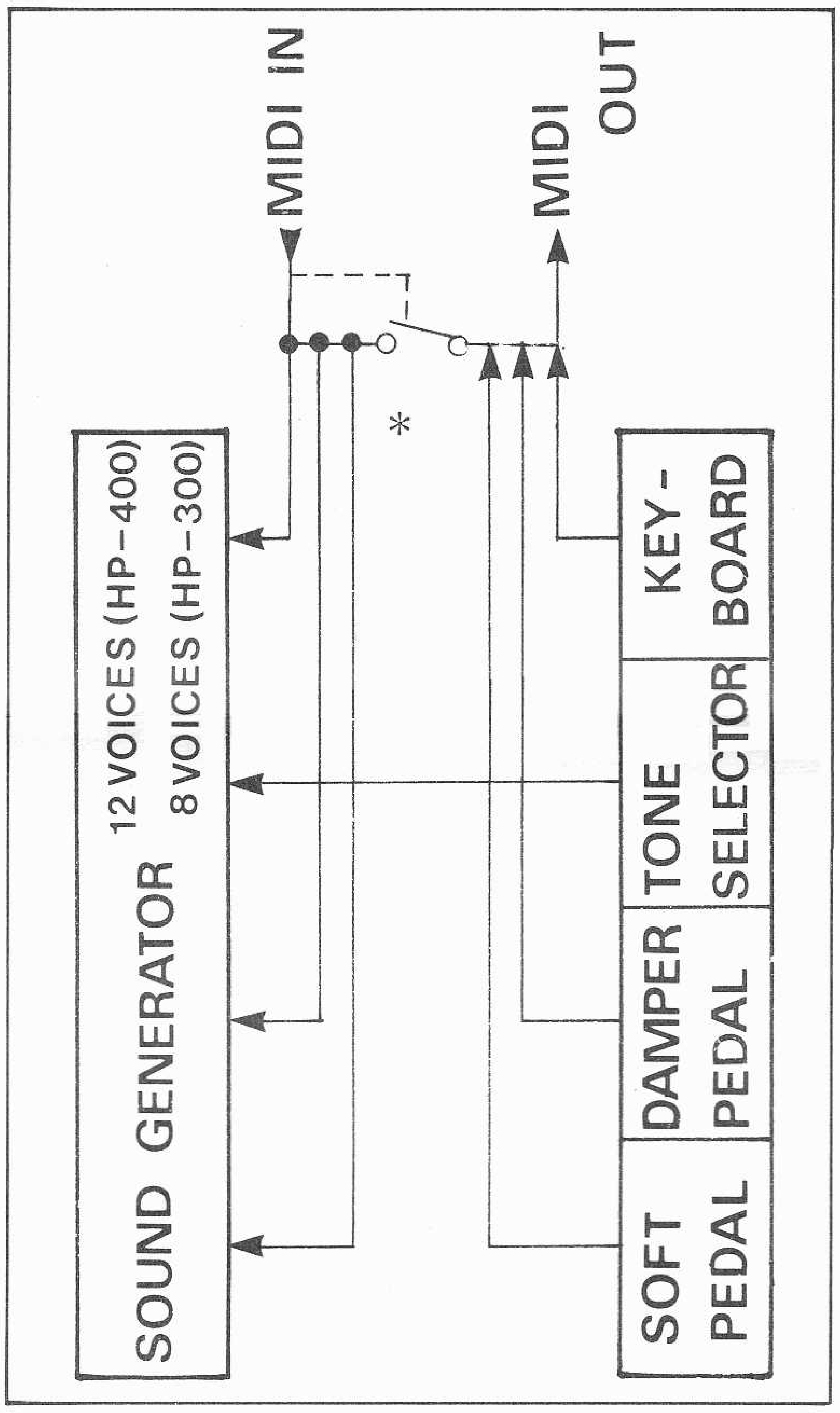
RECOGNIZED RECEIVE DATA IN POLY MODE

Status	Second	Third	Descrption
1000 0000	0kkk kkkk	0vvv vvvv	Note Off
			kkk kkkk = 0 - 127
			vvv vvvv = 0 - 127
1001 0000	0kkk kkkk	0vvv vvvv	Note On
			Note Off
			kkk kkkk = 0 - 127
			vvv vvvv = 1 - 127
1011 0000	0100 0000	0111 1111	Damper On
		0000 0000	Damper Off
1011 0000	0100 0001	0111 1111	Soft On
		0000 0000	Soft Off
1011 0000	0111 1111	0xxx xxxx	All Notes Off
			POLY Mode Select
	0111 1110	0xxx xxxx	All Notes Off
			MONO Mode Select (as OMNI)
	0111 1101	0xxx xxxx	All Notes Off
			OMNI Mode Select

Notes:

1. The transmitter sends All Notes Off code when all the keys are released.
2. The received notes outside the HP-300 (400) keyboard range will be shifted by octave(s) to fall within the range.

* Engaging MIDI IN disconnects some of the intraconnections for optimum operation when linking sequencer.



HP-300, HP-400